IMPACT OF THE HEALTH RISK APPRAISAL PROCESS ON HEALTH BEHAVIORS AND BELIEFS OF COLLEGE FRESHMEN

BY

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To Pearl and Charles Schmidt,

my beloved parents,

whose love, faith, and humanitarian ideals have been

a constant source of strength and inspiration for me

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The purpose of this study was to determine the impact of the Health Risk Appraisal process on health behaviors and health beliefs of college freshmen at average and high health risk levels. Based in Health Belief Model research, an underlying assumption of this investigation was that behavior change resulting from the intervention was attributable to a change in one or more of three beliefs: (a) perceived susceptibility, (b) perceived efficacy, and (c) perceived self-efficacy.

A randomized, pretest-posttest control/comparison group design was used in this study. The Martin Index of Health Behavior and three indices on a Health Belief Questionnaire were administered to 101 voluntary subjects who were divided by risk level into two groups and randomly assigned to one of three treatment conditions: (a) Health Risk Appraisal process group, (b) health information group, and (c) control group. Posttest measurements of the dependent variables were made three weeks after the interventions. A

3(treatment) x 2(risk level) factorial analysis of covariance was employed to analyze the adjusted posttest means for each of the four dependent variables.

Significant differences ($p < .05$) in both perceived susceptibility and perceived self-efficacy were found among the three groups. The Health Risk Appraisal process group scored lower in perceived susceptibility and the control group scored lower in perceived self-efficacy than either of the other two groups, respectively. Higher risk subjects reported fewer health behaviors and weaker self-efficacy beliefs than average risk subjects. Significant intercorrelations between variables revealed moderate negative correlations between health behavior and perceived susceptibility and positive correlations between health behavior and perceived self-efficacy.

Conclusions were that the Health Risk Appraisal process lowers perceived susceptibility and raises perceived self-efficacy but has no direct effect on health behaviors of college freshmen. Since outcomes further suggest that self-efficacy may be the key variable in the actual performance of health behavior, it was speculated that use of health risk appraisal emphasizing participants' abilities to perform recommended health behaviors to gain immediate and future rewards would increase adoption of health behaviors for college students.

CHAPTER I
INTRODUCTION

Since the early 1900s, chronic disease has gradually replaced infectious disease as the leading cause of premature death in America. Heart disease, cancer, and cerebrovascular disease claim the greatest number of lives today, and estimates are that 75% of all deaths are due to degenerative diseases (Califano, 1979). In addition to the increase in mortality caused by chronic disease, since 1950 deaths due to motor vehicle accidents have also increased substantially for those under the age of 40 (P. R. Harris, 1981), and, within the past five years, Acquired Immune Deficiency Syndrome (AIDS), an incurable infectious disease of epidemic proportion, has caused the death of over 15,000 people in the United States (Koop, 1986).

Supported by epidemiological, biomedical, and behavioral research, the 1979 Surgeon General's Report stated that a reduction in these premature death rates and further improvement in health status would be achieved only through the promotion of health and prevention of disease efforts, not through treatment (Califano, 1979). The more recent Surgeon General's Report on AIDS (Koop, 1986) has reemphasized that only changes in personal behavior can control mortality associated with the spread of this

life-threatening, sexually transmitted disease. With the leading causes of death in our country strongly linked to individual health behavior, the development of more effective techniques for motivating changes in lifestyle becomes essential to lower health risks and the rising costs of health care (Matarazzo, 1984).

Although disease or death is not caused by any single factor (Milsum, 1980a), the contributions of smoking to the development of lung cancer; of excess saturated fat, cholesterol consumption, and Type A behavior patterns to heart disease; and of excessive alcohol use and non-use of seat belts to traffic fatalities are well documented (Reed, 1983). In a less substantial way chronic disease has also been associated with poor sleep patterns, low physical activity levels, diets high in sodium and sugar and low in fiber, overweight, and high levels of psychological stress (Mechanic & Cleary, 1980). In fact, strong if not major etiologic factors in 7 of the 10 leading causes of death among Americans today are related to lifestyle and individual behaviors (Matarazzo, 1984). Moreover, high risk sexual practices and intravenous drug use have been correlated with deaths caused by the AIDS virus (Koop, 1986).

The substantial number of studies linking specific behaviors to physical health have led to the now widely accepted belief among health professionals that disease and

mortality patterns of Americans reflect the impact of lifestyle. As Knowles (1977) so succinctly stated "over 99 percent of us are born healthy and made sick as a result of personal misbehavior and environmental conditions" (p. 58).

Earlier public admonitions to change health behavior (U.S. Public Health Service, 1964), the urgency of the message linking behavior to mortality in the 1979 Surgeon General's Report, and subsequent governmental publications have prompted some people who might be defined as "innovators" and "early adopters" of change to adopt suggested health behaviors and abandon destructive habits (Green, Kreuter, Deeds, & Partridge, 1980). Over the past 15 years mortality from all causes has declined because of changes in smoking, diet, and exercise patterns, and treatment for hypertension (P. R. Harris, 1981; Oberman, 1984). Estimates are that 30 million Americans have successfully quit smoking (Schachter, 1982) and that this type of change is attributable to stronger governmental and professional endorsement of prevention programs and strategies. Apparently, where enough resources are allocated to raise the level of consciousness about risks to health, some people will voluntarily modify their health behaviors.

Although statistics indicate a gradual shift in health status as a result of health behavior change in the adult population, indicators of health status are more

disappointing in our adolescent and young adult subpopulation. As a result of health-compromising behavior, such as alcohol and drug abuse and not wearing a seatbelt while driving, premature death and disability rates are high among this relatively healthy adolescent population. While decreasing in the general population, smoking "appears to be on the increase among some adolescents [primarily females], alcohol [and drug] abuse has been called an epidemic, teenage pregnancy rates are on the increase, and a disproportionate percentage of our youth is physically unfit" (Kreuter, Christenson, & Davis, 1983, p. 28). According to data from the National Center for Health Statistics (U.S. Public Health Service, 1982), youth aged 15 to 24 years old had a higher death rate in 1977 than they did in 1960. Major causes of death were attributed to accidents (primarily auto accidents), violence, and suicide.

Not only is current health status jeopardized by health-compromising behaviors, but "there is good evidence that many of the causes of death at age 40 are the result of behaviors that were established during the adolescent and young adult years" (Feeney & Leonardo, 1984. p.270). In a landmark study, Belloc and Breslow (1972) found that among almost 7000 adults surveyed in California, seven individual health practices were positively related to health status and that these practices acted in an apparently cumulative fashion, i.e., the greater the number of health practices

followed, the better the physical health status experienced. Over a five-and-a-half year period data also revealed a clear relationship of lifestyle to mortality; the proportion of men and women in each age group who died was relatively smaller for those following more of the seven health practices, i.e., seven to eight hours of sleep, regular meals, daily breakfast, frequent exercise, moderate alcohol consumption, no smoking, and maintenance of appropriate body weight (Breslow & Enstrom, 1980).

Responsible for their own health habits for perhaps the first time, the approximately 12.4 million youth enrolled in institutions of higher education and post-secondary technical schools (Department of Education, 1984) are particularly at risk for developing unhealthy patterns of living. The uniqueness of the college setting and the developmental tasks of late adolescence create a challenge for even the most conscientious and health-minded students. College students are dealing with the major tasks of competence, autonomy, identity, interpersonal relationships, and intimacy (Chickering, 1969). Separated from home and family for the first time, many students are faced with pressures to experiment sexually and with mood-altering substances, achieve academically, commit themselves occupationally, deal with financial difficulties, and generally to cope with significant and sometimes overwhelming stressors in the campus setting. Avoidance or

compensation for unresolved problems and ineffective coping can easily result in poor eating habits, lack of adequate sleep, alcohol/drug abuse, relationship conflicts, depression, and suicide for a growing number of these young adults (Falk, 1975).

Though "college students are at risk of failing to develop adequate solutions to the challenges of independent living and the increased responsibilities of adulthood" (Drum, 1984, p.509), these young adult years are also an ideal time for remolding of patterns. Colleges and universities are natural settings in which to influence current and future health practices of a large segment of our population. A unique opportunity, therefore, exists to affect the future well-being and lifespan of these young people by helping them to appreciate the importance of health, to accept individual responsibility for their behaviors, to develop the knowledge and skills necessary for health attainment and maintenance, and to moderate self-imposed risks (Stuehler & O'Dell, 1979).

Although promoting healthier behaviors among college students would have positive impact on immediate and long term health status, the obstacles to such health behavior change are numerous. From the outset health behavior change is a formidable task because health behaviors are the result of a complex interplay of many factors, and thus the change process involves a reorganization of one's complete personal

Gestalt, individually unique and created over many years (Milsum, 1980b). Green et al. (1980) have proposed that health behaviors are more difficult to change when they are long established habits and intimately connected to an individual's lifestyle and culture; smoking, alcohol use, and sedentary lifestyles are but a few of our socially acceptable behaviors which meet the criteria of difficulty for change. Initially effortful and lacking in immediate gratification, the adoption of health behaviors may also conflict with values of higher priority such as academic achievement, economic gain, social approval, and meeting the expectations of significant others (Mechanic & Cleary, 1980). In a culture where the economy depends upon high production and consumption, even in the area of medical care, where instant gratification is expected, and unrestricted individual freedom at any cost is considered a right, these value conflicts are inevitable (Knowles, 1977). Furthermore, the link between behavior and disease is not directly observable because symptoms of developing chronic disease are often not diagnosed until several decades after health-compromising habits begin. Reasons for change are therefore not immediately compelling.

The major obstacle to behavior change encountered on college campuses, however, is the students' perceived invulnerability to loss of rigor and health. Their health status, generally adequate if not good, coupled with strong

peer and environmental pressures to engage in unhealthy behaviors creates a real challenge for health promoters and educators (Bloom, 1981). While peer norms and expectations frequently interfere with health behaviors and the taking of responsibility for one's health status (Cafferata, 1980), research has shown that young people are unrealistically optimistic about susceptibility to health problems and that this optimistic bias undermines interest in risk reduction (Urberg & Robbins, 1984; Weinstein, 1982, 1984). A dilemma for health professionals on most college campuses is, therefore, how to motivate the retention or adoption of health behaviors despite lack of a felt need and peer support to the contrary.

Over the years college and university campuses have been the focus of many different health behavior change intiatives. For many years health education classes were the main vehicle for promotion of health-protective behaviors on college campuses. By increasing pertinent health knowledge through structured academic classes, health professionals sought to change attitudes, values, and behaviors of students (Zapka & Love, 1985). Although positive associations between health knowledge and action were reported for those students who took the elective courses (Hyner & Melby, 1985; Meyer, Nash, McAlister, Maccoby, & Farquhar, 1980), it is now generally believed that health knowledge is "a necessary but not sufficient

factor in changing health behavior" (Green et al., 1980, p. 72).

During the 1970s and early 1980s there was widespread development of extra-curricular health education programs, such as workshops, seminars, clubs, and self-help groups for weight-management, smoking cessation, exercise, etc., to motivate individual behavior change, and, more recently, wellness and health promotion programs which attempted to affect not only individual behavior change but institutional norms and policies as well (Hettler, 1984). Again, only those students with prior interest in health were attracted to these non-credit programs which frequently conflicted with other commitments and interests (Zapka & Love, 1985).

A particularly promising health behavior change strategy, health risk appraisal, has been used in many health education and promotion programs to motivate the adoption of health behavior among college students since the mid-1970s (Hettler, 1980). Arising from the prospective medicine philosophy of Robbins and Hall (1970), health risk appraisal was originally developed as an instrument for physicians to use in counseling patients to "promote a healthy life by preventing death and disability due to reducible risk" (Milsum, 1980b, p. 125). Combining a comprehensive computer printout with an interpretive-educational session, health risk appraisal created a learning experience by raising an individual's perceived

vulnerability to illness or disability, increasing awareness of self-responsibility for health status, and recommending behavioral changes to minimize risks to health.

By using the instrument a person's known risk factors may be compared with his or her peers in the general population and an appraised age or risk score over the next 10 years projected. The appraised age, i.e., age ranking of an individual based on risk factors, and an achievable age, i.e., age ranking altered by change in lifestyle, are generally given with recommendations for adaptation of behaviors conducive to health. A wellness score, i.e., the total achievable death rate divided by the total appraisal death rate multiplied by 100 points, can also be computed as "an alternative means of communicating the overall level of a participant's reducible risk" (Lasco, Moriarty, & Nelson, 1985, p. 64). Separate risk factor levels for each of the applicable top 12 causes of death are also provided. Based on (a) U. S. mortality data by age, race, and gender; (b) relative risk data from epidemiological studies; and (c) prevalence data, e.g., amount of smoking and drinking by age/race/sex (Lasco, 1984), calculations are made concerning probabilities of death occurring in the next 10 years and the reduction of risk possible by modification of specific risk factors.

Viewed from the Health Belief Model framework, the printed and/or verbal feedback from a health risk appraisal

questionnaire has the potential to change health behavior by first modifying the beliefs which precede or accompany the initiation of that behavior. According to the original Health Belief Model, adoption of recommended health behaviors is likely when people perceive themselves as susceptible to illness or accident and the condition as serious, believe in the efficacy of the behavior to reduce the threat to health, and see minimal difficulty in undertaking the action. In addition, an internal or external "cue" to take action and a general health motivation or concern for health are assumed to be necessary for the initiation of health behavior change. Finally, factors which modify or enable these beliefs and the readiness to take action are included in the Health Belief Model. Information from a health risk appraisal, therefore, has the potential to heighten perceived susceptibility by personalizing health risks, to enhance the belief in the benefits of taking action by showing the lowering of risk with suggested behavior change, and to decrease barriers to action by providing resource and referral information to assist with change. Additionally, health risk appraisal information may act as a "cue" or trigger for actual initiation of previously considered changes.

Statement of the Problem

A real need for efforts to reduce immediate and long-term health risks among college students is evident from a

review of the most current literature. In a recent survey, alcohol abuse, smoking, drug abuse, intimate relationships, and weight control were among the top 12 most serious problems reported by university students (Henggeler, Sallis, & Cooper, 1980). With an increase in substance use and sexual activity among this population, the need for health education and promotion, with an emphasis on reduction of health risks through behavior change, has intensified over the past decade.

Lester and Leach (1983) reported significant increases in alcohol use, marijuana use, and sexual activity among college undergraduates, particularly women. With the recent increase in the drinking age to 21 in most states, college officials are also predicting an increase in alcohol use and related problems as students drink in uncontrolled settings or turn to other drugs (Ingalls, 1985). Even alcohol-related fatalities among 18 - 20 year old individuals has not shown a consistent decrease in states raising the minimum legal drinking age ("Higher Drinking Age," 1985).

The use of cocaine on college campuses has also increased substantially from 2.5% in 1970 to 44% trying cocaine at least once in 1984 (Greene, 1985). According to most health officials, cocaine is more addictive than heroin and repeated use can lead to numerous physical and emotional health problems.

In addition to the prevalence of substance use, researchers have estimated that as many as 1 in 10 college students suffers from chlamydia, the most prevalent sexually transmitted disease in the United States (T. J. Meyer, 1985). Less monogamous but more sexually active than the adult population, college students are at high risk for this disease and its accompanying symptons and long-term complications, including sterility for women. Furthermore, although the number of cases of AIDS among college undergraduates is small, this population is at risk for exposure to the AIDS virus, for the development of Aids Related Complex (ARC) or AIDS, and for premature death due to the invasion of "opportunistic diseases," such as pneumonia, tuberculosis, or cancer, within 5 to 10 years after graduation (Biemiller, 1987a).

Finally, 1 out of every 20 students, primarily females, is estimated to be at risk for developing an eating disorder which commonly begins in the freshmen year when pressures to achieve and adjust to college life can be overwhelming (Greene, 1986). The real extent of this disorder, which has been linked to weight control and inadequate coping with stress, is currently unknown, but the effects upon health status have been well documented.

Coupled with this intensified need is evidence of increased interest and concern for personal health among young adults (Koplik & DeVito, 1986). In a 1984 Carnegie

Foundation survey of 5000 undergraduates at 310 colleges and universities, 99.4% of the participants responded that good health was a goal considered very important or fairly important to them. In fact, among the 10 goals listed, good health received the highest percentage of responses for an important goal to be achieved (Jacobson, 1986).

Despite evidence of increased need and interest among undergraduates (Koplik & DeVito, 1986), many of them are unwilling to attend health promotion programs or register for health education classes because of competing demands and interests, e.g., required course work, studying, employment, and social activities (McClaran & Sarris, 1985). Time demands for students prevent many of them from participating in structured health promotion activities. Moreover, interest in reducing health risks and achieving good health status is often undermined by unrealistic optimism about susceptibility to illness or accidents (Weinstein, 1984).

Although the use of health risk appraisal in college health programs as a motivator of behavior seems justified, has been well received by the college-age student, and appears to be gaining in popularity (Cottrell & St. Pierre, 1983; Petosa, Hyner, & Melby, 1986), experimental research investigating this health behavior change strategy has been inconclusive. Evidence that health risk appraisal influences health beliefs and behaviors of adolescents and

young adults is not yet persuasive (Kirscht, 1983; Moody & Moriarty, 1983; Wagner, Beery, Schoenback, & Graham, 1982).

Researchers investigating the use of health risk appraisal with college students have reported inconsistent results. Wilson, Wingender, Redican, and Hettler (1980) found no significant differences in health behaviors between 27 undergraduates receiving Risk of Death feedback from the Lifestyle Assessment Questionnaire and a control group of 62 who did not receive results. Similarly, in a total sample of 252 freshmen, Nagelberg (1981) stated that there were no significant differences in health attitudes, values, locus of control, and enrollment in voluntary intervention programs among a no-feedback control group, a mail feedback group, and a peer heath education group after administration of the Database Acquisition for Student Health questionnaire.

More recently, Chan and Davis (1985) reported a significant difference in smoking behavior between two groups of 300 freshmen, one which received a health risk appraisal with interpretation of results and one which did not. At the end of the school year students in the feedback group were more likely to quit smoking, reduce the number of cigarettes, or to not begin smoking. Authors of two additional studies which combined health risk appraisal with health education classes (Chenoweth, 1981; Cottrell & St. Pierre, 1983) concluded that significant differences in

appraised age or health behaviors between health risk appraisal and non-health risk appraisal feedback groups resulted.

Health risk appraisal research with non-college populations has been even more supportive of modest appraised age and behavior changes with health risk appraisal use (Bartlett, Pegues, Shaffer, & Crump, 1983; LaDou, Sherwood, & Hughes, 1979; Lauzon, 1977; Rodnick, 1982). However, a review of this research reveals extreme variations and inconsistency in research design with most studies weakened or confounded by (a) lack of a strong theoretical model guiding the study, (b) emphasis on behavior change as the only dependent variable without regard for prebehavioral factors, (c) lack of a control group, (d) use of volunteer subjects, (e) small sample size, (f) use of the appraised age from a health risk appraisal as the dependent variable, and (g) the combining of health risk appraisal use with other intensive change strategies, e.g., individual or small group health counseling sessions, health education classes, and fitness programs.

The timing of the evaluation has also affected the results of such studies. Whether health risk appraisal has short-term or long-term effects on health behaviors has not yet been determined (Hyner & Melby, 1985); however, as suggested by Bandura (1977a), some strategies may influence initial change while others promote the maintenance of that

change. Health risk appraisal was intended to be used primarily as the first phase in facilitating health behavior change (Hyner & Melby, 1985). If it can be shown that initial behavior change is motivated by health risk appraisal, then more comprehensive follow-up strategies to assist participants in the maintenance of that change can be employed.

Most researchers exploring the effects of health risk appraisal on health behavior change have measured change 3 to 12 months after the intervention. Considering that the short-term effects of many health behavior change strategies and the subsequent relapse of individuals into previous modes of behavior are well-documented in this field (Chesney, 1984; Marlatt & Gordon, 1980), any initial behavior change resulting from health risk appraisal may not have been maintained over this extended length of time. On the other hand, after long periods of time, causal inference is not possible, and assumptions made about the effect of any strategy on behavior may be highly inaccurate. The timing of an evaluation of treatment outcome is crucial to the results of a study and "must distinguish among the initial induction of therapeutic change, its generalization to the natural environment, and its maintenance over time" (Wilson, 1980, p. 16).

In assessing changes in the health beliefs assumed to precede or accompany behavior change (Becker, 1974), timing

of the evaluation is also important. Following an intervention in two recent studies, the immediate increases in posttest scores measuring perceived susceptibility, perceived severity, and perceived barriers decayed over a one-month period of time (Kolbe, 1979; Siero, Kok, & Pruyn, 1984). Since the initial adoption or activation of beliefs are addressed in the Health Belief Model, researchers examining changes in dimensions of the Health Belief Model after a health risk appraisal intervention have generally measured change occurring within a month or less of the intervention to allow enough time for the acceptance of the beliefs but not time for a diminishment in effect (Cioffi, 1980; Faust, Graves, & Vilnius, 1981). Any longer term follow-up would also be measuring the maintenance of beliefs rather than the initial change or adoption of beliefs. This more immediate belief change can also be used as evidence of intervention effectiveness in the short-term because the activation of existing health beliefs or changing of beliefs makes health behavior more likely in the future (Kirscht, 1974).

Currently, impact evaluation, i.e., the evaluation of the immediate effects of a intervention, is the most practical and necessary method of assessing a health belief and behavior change strategy because not only is it economical in terms of time and money, but it is "the level of evaluation most likely to produce the greatest

improvements in such programs" (Green et al., 1980, p.136). By assessing the short-term impact of health risk appraisal on either health beliefs or behaviors, researchers provide data which clarify the next best step in a logical sequence of strategies necessary to assist individuals in initiating, adhering to, and, eventually, maintaining health behaviors over the long term. Innovative and effective short-term approaches are needed as well as techniques to prevent relapse (Brownell, 1982). To plan and implement a program without determining the immediate impact of health risk appraisal on health beliefs and/or behaviors may result in duplication of efforts and a waste of time and resources.

Finally, the characteristics of subjects at different health risk levels, the interaction of initial risk level with a health risk appraisal itself, and the subsequent effect on behavior and belief change has rarely been directly addressed. One notable exception was the study by Cioffi (1980) who reported that low risk individuals whose appraised age was more than two years less than their chronological age had low anxiety about health, a high health value, and perception of self as above average in health status. Nevertheless, no changes in health beliefs were found to be related to the health risk level.

Other researchers using college student populations have contended that because this age group is at very low risk for developing chronic diseases within the next 10

risk appraisal, the present study was designed to determine whether the Health Risk Appraisal process had any immediate effect on either the adoption or retention of health beliefs, i.e., perceived susceptibility to disease or accident, perceived efficacy of preventive behaviors, and perceived self-efficacy to perform suggested health behaviors, and/or the adoption or retention of health behaviors. The extent to which risk level of the students influenced adoption or retention of health beliefs and behaviors was also explored, i.e., whether the Health Risk Appraisal process had a differential effect upon the health beliefs and behaviors of high and average risk students.

Research Hypotheses

In this study the effects of involvement in a Health Risk Appraisal process on the health beliefs and behaviors of high and average health risk college freshmen were examined. The following hypotheses were tested at the .05 level of significance.

1a. There is no significant difference in adjusted scores on a health behavior index among college freshmen involved in the Health Risk Appraisal process, in a health information session, or in neither.

1b. There is no significant difference in adjusted scores on a health behavior index after treatment

years and can gain a minimal number of years of life expectancy under the health risk appraisal system of risk age calculation, they may be less amenable to health risk appraisal than adults over the age of 40 (Cottrell & St. Pierre, 1983; Nagelberg, 1981; Safer, 1982). Dunton and Rasmussen (1977) also concluded that the amount of positive behavior change was directly related to the amount of initial risk identified by a health risk appraisal. However, despite the assumed relationship between risk level and subsequent change and the alleged limitations of using health risk appraisal with healthy young adults, little has been done to actually assess the effects of risk level on cognitive and behavioral outcomes of health risk appraisal.

As a relatively new strategy for health behavior and belief change, the immediate impact of health risk appraisal had not been adequately evaluated, particularly for the college student population. In addition, it was unknown whether the impact of health risk appraisal varied on the basis on the students' initial level of risk. Finally, it was unclear whether health risk appraisal acted to motivate retention of current health behaviors or beliefs and/or adoption of additional health behaviors.

Purpose of the Study

The purpose of this study was to examine the cognitive and behavioral impact of the Health Risk Appraisal process on college freshmen. Expanding upon prior work in health

between high and average health risk levels of college freshmen.

1c. There is no significant interaction effect of risk level and treatment on the adjusted scores on a health behavior index of college freshmen.

2a. There is no significant difference in adjusted scores on the health beliefs index measuring perceived susceptibility to illness or accidents among college freshmen involved in the Health Risk Appraisal process, in a health information session, or in neither.

2b. There is no significant difference in adjusted scores on the health beliefs index measuring perceived susceptibility to illness or accidents after treatment between high and average health risk levels of college freshmen.

2c. There is no significant interaction effect of risk level and treatment on the adjusted scores on the health beliefs index measuring perceived susceptibility to illness or accidents of college freshmen.

3a. There is no significant difference in adjusted scores on the health beliefs index measuring perceived efficacy of preventive action among college freshmen involved in the Health Risk

Appraisal process, in a health information session, or in neither.

3b. There is no significant difference in adjusted scores on the health beliefs index measuring perceived efficacy of preventive action after treatment between high and average health risk levels of college freshmen.

3c. There is no significant interaction effect of risk level and treatment on the adjusted scores on the health beliefs index measuring perceived efficacy of preventive action of college freshmen.

4a. There is no significant difference in adjusted scores on the health beliefs index measuring perceived self-efficacy to perform a health behavior among college freshmen involved in the Health Risk Appraisal process, in a health information session, or in neither.

4b. There is no significant difference in adjusted scores on the health beliefs index measuring perceived self-efficacy to perform a health behavior after treatment between high and average health risk levels of college freshmen.

4c. There is no significant interaction effect of risk level and treatment on the adjusted scores on the health beliefs index measuring perceived

self-efficacy to perform a health behavior of college freshmen.

Importance of the Study

The impact of health risk appraisal on college students is further clarified in this study based on the Health Belief Model (Becker, 1974), self-efficacy theory (Bandura, 1977b), and communication/persuasion theory (Beck & Frankel, 1981). In addition, a contribution is made to the growing body of literature addressing the effect of this strategy on health beliefs and behaviors. Additionally, this investigation has important implications for the development and delivery of health risk reduction programs in higher education and for the professional in health counseling.

According to cognitive models of health behavior change, prebehavioral changes in knowledge, attitudes, values, and perceptions may be predisposing factors to actual behavior change (Green et al., 1980). Beliefs concerning health, particularly beliefs identified as perceptions of susceptibility to disease or disability, response or outcome efficacy, and barriers to action, particularly personal or self-efficacy, have been shown to be related to and predictive of health behavior (Bandura, 1977a; Beck & Frankel, 1981; Janz & Becker, 1984). Findings from research based on cognitively oriented models may ultimately yield more useful information for enhancing the impact of health risk appraisal (Cioffi, 1980). Therefore,

in addition to determining the effect of health risk appraisal on health behaviors, the impact of health risk appraisal on health beliefs is also determined.

Despite a continuing need for the development and evaluation of risk reduction programs, particularly for places where large populations can be reached over time and the benefit-to-cost ratios are favorable (Knowles, 1977), limited resources and budget cuts in higher education make a reduction in student health and counseling services likely (Shropshire, Van Ginkle, & Goodale, 1985). If cost containment efforts in higher education are not to result in the virtual elimination of college health promotion programs, the most efficient yet least offensive ways of motivating the retention or adoption of health behaviors by college students must be identified.

A primary prevention strategy, health risk appraisal, selectively applied, may be a cost effective method to reduce the current and future health risks for a large number of students. Computerized assessments are typically "inexpensive, noninvasive, personalized health assessment tools" (Petosa, Hyner, & Melby, 1986, p. 52) and can be used with large groups where general risk reduction is the objective (Neutens & Pursley, 1985). By determining the cognitive and behavioral effects of the Health Risk Appraisal process on high and average risk college students, the immediate impact of this strategy on health behavior and

beliefs among college freshmen of different risk levels is revealed. For whom and in what way health risk appraisal is most effectively utilized is also clarified. Therefore, the future investment of time and energy in health risk reduction programming for this young adult population can be guided more efficiently by the results of this study.

In an era of limited resources and increased demands for accountability, empirical evaluation of health risk reduction strategies becomes essential to justify their use. Although the efficacy of health risk appraisal has received preliminary support as an approach to stimulate behavior change (Weiss, 1984), the lack of well-controlled research designs and a plethora of contradictory results from studies done on college campuses necessitates continued investment of time and energy in the development and evaluation of this risk reduction strategy (Fielding, 1982; Wagner, Beery, Schoenbach, & Graham, 1982).

By further testing the effectiveness of a widely adopted health promotion strategy, this study also contributes to knowledge utilized by health counseling professionals whose primary role is to identify health risks and plan intervention strategies before the onset of illness or disability (Childers & Guyton, 1985). Health counselors provide expertise in the promotion of self-regulation and self-control of health behavior for individuals, small groups, and large organizations (Southern & Hannaford,

1981). By basing their use of facilitation strategies on well-designed research, health counselors can have a greater impact on the health status of their clients. Results of this research facilitates increased awareness of the appropriate applications and potential effects of health risk appraisal on clients' adoption or retention of health behaviors and health beliefs.

Definition of Terms

To further one's understanding of the research hypotheses and methodology used in this study, the following terms are clarified:

College freshmen are students, with 12 semester hours or less of college level work credited toward graduation requirements, entering a four-year private, protestant college in the autumn term of 1986.

Health risk appraisal is a general method using a standardized questionnaire and health status feedback describing an individual's chances of dying or acquiring specific diseases, usually within a 10-year period of time (Fielding, 1982).

Health Risk Appraisal process refers to the administration of the Centers for Disease Control (CDC), Atlanta, Georgia, Health Risk Appraisal questionnaire, scoring of the data using the October 1984, CDC large computer software program, return of the computerized feedback forms, (see Appendix A), group interpretation of

results, response to questions, advocacy of and recommendations for adoption or retention of health behaviors, and dissemination of resource and referral information to assist with voluntary behavior changes (see Appendix B).

Health information session refers to a group session incorporating advocacy of and recommendations for adoption or retention of health behaviors and dissemination of resource and referral information to assist with voluntary behavior changes. This session duplicates the Health Risk Appraisal process with the exclusion of the return and interpretation of the computerized feedback form from the Health Risk Appraisal questionnaire.

Health risk level is the classification of an individual as high, average, or low health risk based on the value obtained by substracting the health risk appraisal appraised age from the individual's actual age.

Low health risk is a lower than average risk for disease or accidents within the next 10 years. In this study an individual whose appraised age was more than two years less than his or her actual age is at low health risk.

Average health risk is an average risk for disease and accidents within the next 10 years. In this study an individual whose appraised age was within two years of his or her actual age is at average health risk.

High health risk is a greater than average risk for disease or accidents in the next 10 years. In this study an individual whose appraised age was two or more years greater than his or her actual age is at high health risk.

Health behavior is any behavior performed by a person to protect, promote, or maintain his or her health as measured by a health behavior questionnaire (see Appendix C).

Health beliefs are beliefs identified in the Health Belief Model concerning susceptibility to disease or accident, the efficacy of recommended action, and barriers to suggested action, particularly self-efficacy, as measured by a health belief questionnaire (see Appendix C).

Organization of the Study

The remainder of this study is organized into four chapters. The second chapter is a review of literature and includes discussion of (a) health behavior and belief theory, (b) strategies of health behavior change, (c) health risk appraisal as a health behavior and belief change strategy, (d) health behavior and beliefs of college students, and (e) health behavior change strategies in higher education. Chapter III contains the research methodology, chapter IV incorporates the results of the study, and chapter V includes a summary of the investigation, a discussion of its implications, and suggestions for future research.

CHAPTER II
REVIEW OF THE LITERATURE

In this chapter literature related to the current study is reviewed in five topical areas: (a) the nature of health behavior and the relationship between health behavior and health beliefs, (b) current approaches to changing health behavior, (c) health risk appraisal as a health belief and behavior change strategy, (d) health behavior and beliefs of college students, and (e) strategies employed to change college student health behavior.

Health Behavior and Health Beliefs

Health Behavior

Although behavior related to health has been described in elaborate terms, any behavior undertaken to promote health and to reduce risks to health is simply a health behavior (Taylor, 1986). The classic term, preventive health behavior, has referred primarily to medically approved and recommended behavior "undertaken by a person believing himself to be healthy, for the purpose of preventing disease or detecting it in an asymptomatic stage" (Kasl & Cobb, 1966, p. 246). The newer phrase, health protective behavior, originated with Harris and Guten (1979) to define behavior "performed by a person, regardless of his or her perceived or actual health status, in order to

protect, promote, or maintain his or her health, whether or not such behavior is objectively effective toward that end" (p. 18). This latter definition included a wide range of activities believed to promote health, some of which were not necessarily sanctioned by health care professionals nor supported by scientific research.

Recently researchers have suggested that "disease prevention behavior," i.e., behaviors that require the assistance of a health professional, and "health promotion behavior," i.e., behaviors not requiring professional contact such as exercise and eating nutritiously, are "two different entities" (Yoder, Jones, & Jones, 1985, p. 30) and that practicing disease prevention does not necessarily correlate with practicing health promotion. Firmly established health behaviors, performed automatically without conscious awareness and partially independent of reinforcement, have been further delineated as "health habits" which are maintained primarily through practice and repetition (Hunt, Matarazzo, Weiss, & Gentry, 1979).

Thus health behavior may be multidimensional rather than unidimensional and the performance of one type of behavior may be independent of other health behaviors. Research agreement on the nature and extent of the association among health behaviors has been lacking (Kirscht, 1983).

Two independent clusters of health behaviors, "direct risk behaviors," e.g., driving and pedestrian behavior, personal hygiene, and smoking, and "indirect risk behaviors," e.g., medical checkups, screening exams, immunizations, nutrition, and exercise, were found in a survey of 617 adults in Illinois by Langlie (1979). A study based on 842 interviews of adults in Ohio (Harris & Guten, 1979) revealed that health protective behavior clustered into five groups: (a) health practices such as sleep, diet, weight control, and exercise; (b) safety practices; (c) preventive health care, e.g., medical checkups; (d) environmental hazard avoidance; and (e) harmful substance avoidance. Conversely, in a study of 330 adults, Mechanic (1979) stated that the 10 dimensions of health behaviors assessed were only modestly intercorrelated. However, he combined eight of the dimensions into a single index of degree of positive health behavior for each subject and drew the conclusion from an additional analysis that positive behavior for an adult is part of a comprehensive lifestyle reflecting the ability to anticipate health problems, mobilize to meet them, and cope actively (Mechanic & Cleary, 1980).

This concept of a broad health orientation or lifestyle has been proposed by a number of researchers who have asserted that health behaviors are not unidimensional but part of a fundamental orientation toward life (Antonovsky,

1979; Epstein, 1979; Matarazzo, 1984). Agreement on the underlying elements of this orientation has not been reached.

Much of the problem in determining the association among health behaviors has been a function of measurement. Epstein (1979) demonstrated that when measures of a behavior were averaged over a greater number of events, stability coefficients for such behaviors increased to high levels. Most researchers have assessed health behaviors on only one or two occasions and therefore have obtained low correlations.

Other problems associated with assessing health behavior are related to the method of attaining data which has primarily been through self-report. In particular, the need for social approval has been strongly associated with general measures of preventive health behavior. In a study measuring this relationship within samples of the British public and students at the University of Toronto, Canada (N = 637), 21 of the 60 correlations between a measure of health behaviors and the scores on a social desirability scale were significant, $p<.05$ (Kristiansen & Harding, 1984). Optimal assessment procedures for socially sensitive health behaviors such as smoking or alcohol use have involved physiological measurements, outside observation, and self-monitoring of the specific behavior. Reliance upon self-report alone has been a limitation in behavioral studies.

The inconsistency of health behavior over time has also been noted (Mechanic 1979). With the exception of firmly established health habits (Hunt et al., 1979), change in internal and external factors influencing the individual's behavior has resulted in the modification of the health behavior. This has been most apparent in studies of consciously made and highly desired health behavior change where maintenance rates have been low (Brownell, 1982; Lichtenstein, 1982; Marlatt & Gordon, 1980; Martin & Dubbert, 1982).

The fact that health behavior is a highly complex phenomenon and a function of multiple factors has been supported by the information from health behavior surveys. The next step of identifying the factors which influence health behavior has been of central concern to those in the health-related professions attempting to assist people in the modification of such behavior.

The significance of education, age, income, and involvement in a social network in predicting health behavior was revealed in an analysis of a 1979 national survey of health practices (Gottlieb & Green, 1984). In this study, income, education, and social support were positively related and age was negatively related to health behavior for both male and female adults. In a path analysis of the female data, education had a positive direct effect, and age had a direct negative effect on health

practices. For males the direct effect of age on health practices was not significant. The social network elements of church attendance and marriage were also positively related to a reduction of alcohol and tobacco use for both men and women. Marriage was, however, negatively associated with exercise in men. Mechanic and Cleary (1980) have also reported that female gender is positively related to health behavior and that alcohol use, risk-taking, and a low level of preventive medical checkups were more common among adult males than adult females.

An examination of the data on age and health behavior has indicated that while younger children and adults take moderately good care of their health, adolescents and young adults compromise their health behavior in an attempt to achieve independence, confirm a personal identity, cope with stress, rebel against conventional norms, or achieve an alliance with their peers (Green, 1981). In the 1980s, a pattern of heavy alcohol and illicit drug use, cigarette smoking, and precocious sexual activity has emerged among adolescents that is the antithesis of health behavior. Equally prevalent for males and females, this problem behavior may constitute a syndrome or interrelated cluster of behaviors (Jessor, 1982). The occurrence of this syndrome has been negatively related to conventional and achievement-oriented behavior and has shown a developmental

increase among adolescents moving from 7th to 12th grades (Jessor, 1984).

Considering the numerous potential determinants of health behavior among different age, gender, socioeconomic status, marital status, and educational level groups, it is not surprising that countless theories have been developed to explain health behavior. Currently no comprehensive single model has been widely accepted or consistently applied in research to meet the criterion of being a paradigm in this field (Parcel, 1983).

In an attempt to develop a unified framework for explaining health behavior, Cummings, Becker, and Maile (1980) asked the model builders to partition a set of 109 variables from 14 different models into 12 - 14 groups based on similarity. Using a smallest space analysis, six common factors emerged: (a) accessibility to health services, including cost and availability; (b) attitudes toward benefits and quality of health care; (c) threat of illness and beliefs about susceptibility and consequences of disease; (d) social network characteristics; (e) knowledge about disease; and (f) demographic characteristics. These findings have suggested that the models are not independent and that there is substantial overlap among the elements found in the different frameworks.

Health Beliefs

In the most widely applied approach to the explanation of health behavior, i. e., the Health Belief Model (Rosenstock & Kirscht, 1979), health behavior is a consequence of prebehavioral beliefs. Although this model has been applied extensively to the explanation of medically based action, it has also been applied to the investigation of other health behaviors, e.g., contraceptive behavior (Hester & Macrina, 1985), exercise (Slenker, Price, Roberts, & Jurs, 1984), and breast self-exam (Calnan & Moss, 1984). Since its inception in 1966, the Health Belief Model has continued to evolve and currently has a number of variables in common with many other models, particularly social learning theory and fear appeals communication theory.

According to the original Health Belief Model (Rosenstock, 1974), the likelihood of an individual adopting a health behavior is a function of four specific beliefs: (a) perceived susceptibility to threat of illness or harm, (b) perceived seriousness of the threat, (c) perceived benefits of preventive action, and (d) perceived barriers to action. More recent modifications of the model have also incorporated "cues" to action which bring a health decision into conscious awareness, a positive health motivation, and various modifying factors, such as demographic, structural, attitudinal, interactional, and enabling factors (Becker & Maiman, 1975; Becker, Maiman, Kirscht, Haefner, & Drachman,

1977). Although many researchers have suggested further refinements of the model, e.g., locus of control (Wallston & Wallston, 1978), health value (Lau, Hartman, & Ware, 1986), and social support (Langlie, 1977), the original principles remain the focus of most research.

Related to psychological theories of decision-making under conditions of uncertainty, the revised Health Belief Model is an expectancy-theory approach which views action as related to a subjective desire to lower susceptiblity and severity and an estimation of benefits minus costs; the incentive value of any health action is therefore its ability to lower perceived susceptibility and severity (Maiman & Becker, 1974). Thus health behavior becomes more likely when both the perception of threat or ill health and the perceived value of the behavior are increased as the perceived obstacles to action are reduced (Kirscht, 1974). Behavior change strategies based on this model tend primarily to emphasize increasing an individual's perception of personal risk, enhancing the belief that change will result in the expected outcome of reduced risk, and reducing the perception of barriers by increasing opportunities for action, personal health skills, and the individual's perceived capability to take appropriate action.

Summary results from a critical review of 29 Health Belief Model-related investigations from 1974-1984 (Janz & Becker, 1984) have provided substantial empirical support

for the Health Belief Model from both prospective and retrospective research and have confirmed the strength of the Health Belief Model to provide a conceptual basis for health behavior and its modification. Research over the past 20 years in the area of health beliefs has continued to support a high correlation between both perceived susceptibility to illness and perceived benefits of taking action and adopting health behaviors (Shortell, 1984). However, beliefs concerning perceived barriers and perceived susceptibility have proven to be the most powerful of the Health Belief Model dimensions (Janz & Becker, 1984).

In a recent study of exercise behavior, Slenker, Price, Roberts, and Jurs (1984) reported that 61% of the variance between the sample of 124 joggers and 96 nonexercisers was accounted for through an analysis based on eight predictor variables of the Health Belief Model. The top three items on the questionnaire with the highest correlation to the criterion variable of jogging vs. nonexercising were measurements of barriers. The authors concluded that the major factor separating joggers from nonexercisers was perceived barriers.

Similarly, in a sample of 111 college students, secondary school teachers, and licensed practical nurses the most frequently performed health behaviors were those that required the least effort but were perceived as more effective (Turk, Rudy, & Salovey, 1984). Effort and

effectiveness correspond respectively to the concepts perceived costs or barriers and perceived benefits of the Health Belief Model. The fact that students and teachers were more concerned with effectiveness while nurses were more concerned with effort also suggested that perhaps different dimensions of the Health Belief Model were relevant for different populations in explaining health behavior.

The Health Belief Model provides an explanation for the impact of the health risk appraisal process on health behaviors. By increasing the perceived susceptibility to disease or accident, i.e., health risk age and probabilities of death within the next 10 years and the perceived benefits of health behavior, i.e., increased lifespan and avoidance of illness, and, at the same time, by decreasing the barriers to action, i.e., ignorance of effective health action and the availability of resources, and lack of self-confidence, the health risk appraisal process may directly affect the beliefs which precede health behavior.

Health Behavior Change

"Inconsistencies, unanswered questions, and rapid development" (Davidson & Davidson, 1980, p. xvi) depict the current state of the art of research and practice in health behavior change. Efforts to modify health behavior have been made with mixed results in a variety of settings (Reed, 1983). Strategies have been applied in programs at the

individual, group, and community level and have included both passive and active approaches (Williams, 1982).

In the public health domain the passive approach has been successful in reducing potential harm to health with pasteurization of milk and treatment of water serving as two good examples. Even more recently federal standards for new cars manufactured since 1968 resulted in a decrease of an estimated 9,000 deaths per year of drivers and passengers (Robertson, 1981). However, the enactment of laws requiring behavior change has not been as successful as environmental modification, particularly with behaviors which are not publically observable. It has been estimated that only about 1 in 2,000 individuals driving under the influence of alcohol are actually arrested for the offense (Robertson, 1984).

Although researchers have continued to show that environmental conditions contribute substantially to chronic disease and accident rates, most solutions also involve individual behavior change, i.e., active strategies. In contrast to the passive approach, active strategies require implementation by individuals and have been useful only when people are influenced through education, mass media communication, legal sanctions, and behavior modification techniques to apply measures regularly.

Ever since the identification of <u>risk factors</u>, i.e., habits which put one at risk for disease or premature death,

they have been the main targets of intervention and have spawned a new approach to medical care that is both behavioral and preventive (Matarazzo, 1984). The concept of risk was basically derived from epidemiological investigation in which incidence rates of a disease or cause of death were related to a given factor suspected of affecting health (Milsum, 1984). Reducing the risk factors became a national commitment when the federal government established 15 health goals which, if attained, were intended to produce better health for Americans by 1990 (P. R. Harris, 1981). Goals under the area of health promotion included reduction of risk through change in the targeted behaviors of smoking, alcohol and drug misuse, nutrition, physical fitness and exercise, and control of stress and violent behavior.

The difficulty with these and similar behaviors has been that individuals must be personally motivated to adopt and maintain health practices over a lifetime if health risks are to be minimized. In addition, health behavior, unless it threatens the welfare of another, is voluntary behavior and thus change cannot be imposed but must be motivated through education and persuasion (Green et al., 1980).

In motivating the long-term adoption of voluntary health behavior, health care professionals have met with limited success. Although the goal of intervention programs

has been behavior change, Green et al. (1980) have suggested that the expectation of immediate change in health practices for the majority of participants has been unrealistic and naive.

One explanation posited for this lack of change has been related to the nature of the health behavior change process. According to Brown (1976), health behavior change occurs progressively and by sequential stages. She has proposed that the five stages organized in a hierarchical fashion are (a) awareness of risk to health, (b) acceptance of information concerning the health risk, (c) integration of this information into the self-image, (d) effort toward behavior change, and (e) achievement of behavior change. This concept of stages in the adoption of a behavior has grown out of the research in communication, education, and public health.

Green et al. (1980) have extended the notion of stages in behavior change in the PRECEDE, i.e., Predisposing, Reinforcing, and Enabling Causes in Educational Diagnosis and Evaluation, model of health education programming. In accordance with this approach, an initial motivation to act, followed by the deployment of resources to enable the behavior, and the reaction to the behavior by others act either to strengthen or weaken a recommended health behavior.

With the inception of the Health Belief Model this concept of belief change preceding behavior change has been widely supported; however, the process of building toward the threshold of actual initiation of change as explained by the PRECEDE and similar models has not yet been fully clarified (Milsum 1980b). The concept of stages and evidence that the effectiveness of a health behavior change strategy is enhanced when a variety of methods are used have led theorists to suggest that the optimal strategies to change behavior are dependent not only upon the specific characterisitics of the health behavior itself, but also upon which predisposing beliefs and knowledge, enabling resources and skills, and reinforcing factors, e.g., feedback and social support, are lacking (Green & Lewis, 1986). Only through a thorough assessment of the health problem and related behavior could the focus of the most effective intervention be identified.

Another conceptual basis for health behavior change is found in the persuasive communication research regarding fear appeals (Beck & Frankel, 1981). Although varied results and marked inconsistency have characterized the history of research in threatening health communications (Kirscht, 1983), evidence exists that belief in risk and its implications has to be developed before attention is given to risk reduction methods (Green et al., 1980), and that

increased attitude and behavior change occurs under conditions of strong threat information.

Exposing 80 adults to one of four versions of a 13-minute, slide-tape communication about periodontal disease, Beck and Lund (1981) investigated the relationship between high fear arousal and performing the recommended behavior to prevent the disease. The four messages varied in seriousness and susceptibility information and, across all versions, recommended effective oral hygiene procedures to reduce the health threat. The high threat message generated the greatest amount of fear, intention to comply, and actual compliance with the procedures; in addition, the researchers found that perceived self-efficacy in performing the behavior was the best predictor of the actual behavior.

Although fear may act to focus attention on risks, researchers have generally confirmed that fear arousal alone is insufficient for immediate and long term changes (Beck & Lund, 1981; Leventhal, 1970; Smith, 1982). Basing their research on protection motivation theory, Rogers and Mewborn (1976) demonstrated that for smoking, driving, and venereal disease, increments in the outcome efficacy variable and the noxiousness variable increased the intentions of 176 college students to adopt the recommended practices; however, when the coping responses were portrayed as ineffective, increase in noxiousness had no effect or was inversely related to intention to adopt practices. The ability to control danger

apparently strengthened the intentions to adopt recommended behaviors whereas lack of control had the opposite effect.

In a more recent study, Sutton and Eiser (1984) examined the effects of viewing a highly threatening video tape on smoking and health risks with a sample of 61 adults in London. Intention to stop smoking was significantly correlated with high fear arousal and high reported confidence in the ability to stop smoking. Three months later self-reported behavior was directly affected by intention.

In integrating existing theoretical approaches in the fear appeal literature, Beck and Frankel (1981) have theorized that beliefs concerning personal success in controlling the threat, i.e., perceived threat control, appear to be prime factors in determining whether or not subsequent behavior will be initiated. It was suggested that the motivational effect of a health threat communication depends primarily on two of the recipient's beliefs: response efficacy or the perceived ability of the recommended actions to control the threat (called perceived benefit of action in the Health Belief Model) and personal efficacy or perceived ability of a person to perform recommended actions successfully (called perceived barriers to action in the Health Belief Model). Of the two beliefs personal efficacy has been found to be the critical factor in determining subsequent protective behavior in a number of

studies (Beck & Lund, 1981; Rogers, Deckner, & Mewborn, 1978).

Another more familiar term for personal efficacy, self-efficacy, has been associated with social learning theory (Bandura, 1977b). Social learning theory supports the view that behavior is significantly influenced by three regulatory systems: antecedent events, consequent events, and mediational cognitive processes. A recent refinement of social learning theory has focused on the significance of self-efficacy or personal control in the generalization of coping behavior (Bandura & Adams, 1977). The conviction that one can successfully perform a behavior to produce a specific outcome has been shown to influence the execution and persistence of behavior and the generalization of the behavior to other situations (Wilson, 1980). In the original study with adult snake phobics, Bandura (1977a) extinguished anxiety reactions through desensitization, yet subjects emerged with varying degrees of self-efficacy expectations. The actual post-treatment performance of subjects corresponded closely to level of self-efficacy which was an accurate predictor of performance on 85% of all tasks. In other studies investigators have shown that the level of self-efficacy is significantly related to smoking cessation (Condiotte & Lichtenstein, 1981), pain tolerance (Vallis & Bucher, 1986), and tennis performance (Barling & Abel, 1983).

Most behavior change strategies can be classified as (a) attitude-change or communication approaches and (b) behavioral-change or skills training approaches; many are a combination of the two. Attitude change strategies have primarily been applied in primary prevention efforts to encourage the maintenance of health behavior and the avoidance of risk factors while behavioral-change methods have been more frequently applied in secondary prevention efforts to change frequent and complex behaviors (Taylor, 1986).

In recent years mass media campaigns have been advocated as a way to communicate health-related information and to change health attitudes and behaviors on a large-scale basis in the community. An increasing number of attempts have been made to influence general health, safety, smoking, alcohol and drug use, family planning, and medical checkup behavior via the electronic and print media (Alcalay, 1983; Flay, DiTecco, & Schlegel, 1980). Although "public communication campaigns to induce people to adopt more healthful lifestyles have had only modest success" (McGuire, 1984, p. 303), the Stanford Three Community Project (Meyer, Nash, McAlister, Maccoby, & Farquhar, 1980) and the North Karelia program in Finland (Puska, Tuomilehto, Salonen, Neittaanmaki, Maki, Virtamo, Nissenen, Koskela, & Takalo, 1979) have yielded promising results.

One of the largest preventive medicine research efforts in the United States, the Stanford Three Community study was a mass media campaign initiated in 1972 to reduce the risks associated with heart disease in three California communities. In the first phase residents of two small communities similar in size and socioeconomic status were exposed to a three-year massive media campaign to modify smoking, fat consumption, and exercise behavior; to increase knowledge of risk factors; and to alter various physiologic indicators of risk. Receiving no information, the third community acted as a control. In addition to the information received through the electronic and print media, in one of the experimental communities people at high risk for heart disease received intensive face-to-face instruction in behavioral self-control techniques. For both of the experimental communities, a 20% reduction in a total risk index , i.e., changes in blood pressure, obesity, cholesterol level, consumption of fats, and smoking resulted from the interventions. The media plus face-to-face intervention group also maintained a significantly greater reduction in smoking behavior. In general, it was discovered that the media alone successfully reduced risk to heart disease, but with the addition of behavioral strategies, a greater magnitude of immediate and long-term modification resulted. Weight loss maintenance and exercise were influenced least by this media strategy. Commenting on

the effectiveness of this study, Kasl (1980) noted that assessment of the stage of readiness of the target population for various lifestyle changes and a determination of the preferred strategy was needed to increase the power of the mass media intervention.

A five-year mass media campaign directed at North Karelia, Finland, a rural community of 180,000 having a very high incidence of heart disease, also resulted in a reduction in the levels of risk factors (Puska et al., 1979). A 17% decrease in cardiovascular disease risk for males and an 11.5% decrease for females resulted. A 10-year followup evaluation showed an even further reduction in risk level (Puska, 1984).

In contrast to these promising results, television campaigns promoting the use of seat belts have resulted in no significant changes in levels of use (Robertson, 1978). Furthermore, in evaluating the effectiveness of a series of public television shows on alcohol use, Dickman and Keil (1977) found that few people watched the series, and of those who did, only 40% reported an increased awareness of alcohol as a personal problem. A decision to seek treatment or recommend treatment for another also did not result.

Although inconclusive evidence of modest attitude and behavior change has been associated with mass media health campaigns, more extensive change has been noted when multiple forms of media and behavioral-change strategies

have been combined (Maccoby & Alexander, 1980). How much change in knowledge, belief, and behavior has been facilitated by exposure to a mass media campaign has not yet been clearly determined.

Within the school setting attempts to influence health behavior have been through formal instruction in a health education course. Lecture-discussion and audiovisual aids have been used to convey factual information to children and adolescents while peer-group discussions have been held to encourage peer support for health behavior. Currently computer software has been introduced as a motivational device with self-assessments, games, and programmed instruction made increasingly available in health education classes (Gold & Duncan, 1980).

School health education classes have had a limited impact on the health knowledge, attitudes, skills, and behaviors of children and adolescents; Knowles (1977) noted that health education programs in schools were generally abysmal and that the effectiveness of these interventions in reducing overall risk-taking behavior among youth had not been properly assessed. In a review of several health knowledge studies, Pigg (1983) found that American children and young adults had not learned fundamental health concepts and that their level of health knowledge was not substantially increasing. Levin (1979) even suggested that school-age children were one of the major groups which

lacked appropriate self-care education programs. As a result of these poorly financed and delivered health education programs, high school graduates have frequently exited the formal educational system without adequate health knowledge or the skills and motivation necessary to adopt health behaviors.

A notable exception has been a skills training approach to inoculate young adolescents against the peer pressure which encourages smoking behavior. Referred to as the Houston project, Evans, Rozelle, and Mittlemark (1978) developed a preventive approach by focusing on training adolescents to be more aware of and to cope actively with pressures to smoke from peers, adult models, and the media. Rates of smoking were significantly reduced in the experimental schools using this approach. Botvin, Eng, and Williams (1980) further refined this concept in the life skills curriculum for adolescents to build a positive self-image, assertiveness and decision-making skills, and coping strategies to deal with peer pressure to smoke.

Where the focus of health educators and public health professionals has been on risk reduction in large populations within the school and community, the focus of effort for clinicians, physicians, and behavioral scientists has been at the individual and small group level. During the past decade, innovative procedures for the modification of health behavior have been created, researched, and

described extensively in the literature (Stachnik, Stoffelmayr, & Hoppe, 1983). An emphasis on individuals, the assessment of overt target behavior, the antecedents and consequences of the behavior, and, for cognitive behavioral proponents, accompanying thoughts, beliefs, and images, has characterized the behavioral approach to health behavior modification (Chesney, 1984). Some specific techniques have included reinforcement of desired behavior, contingencies, shaping, modeling, stimulus control, contracting, skills training, and monitoring of targetted behavior. Behavioral self-management techniques, including self-monitoring, self-evaluation, self-reinforcement, and stimulus control, have also received increased attention and have been recommended as a way to prevent relapse of behavior to pretreatment levels, particularly with smoking cessation, exercise, and weight control behavior (Kanfer, 1980).

For the management of difficult health problems, such as obesity, smoking, and alcohol use which involve the acquisition of new behavior and the elimination of undesired behavior, behavior modification methods have been the most successful; however, long-term adherence rates for most interventions have tended to be low (Kaplan, 1984). In a review of the literature on the effectiveness of smoking cessation programs, Leventhal and Cleary (1980) found that although most treated smokers are able to quit, a majority resume smoking within a few months. Brownell (1982) and

Martin and Dubbert (1982) made the same observations about behavior related to obesity and exercise respectively.

A major intervention study based primarily upon behavioral modification strategies, the Multiple Risk Factor Intervention Trial Research Group (1982) involved 12,000 males age 35 to 57 in the upper 10% of the population by risk factor for heart disease. During a 5-year study, 6000 of the patients were randomly assigned to a special intervention program where informational and group behavioral strategies to reduce smoking, change dietary habits, and increase exercise were used to supplement traditional treatment for hypertension. These men were compared at regular intervals for 7 years to a control group which only received usual care for risk reduction from personal physicians. In comparison to predicted rates, results indicated that for both groups risk factors declined but to a greater degree for the experiemental group. Although the rate of mortality due to coronary heart disease between the two groups was not statistically significant, confounding variables, such as unfavorable reactions to a hypertension drug and unexpected risk factor reduction among the control group, were cited as reasonable explanations for a lack of difference.

Although modest effects of strategies upon health behavior change have been reported in the behavioral intervention literature, criticisms concerning the cost and

time consumption of such strategies have surfaced. The major issue concerning maintenance of change has only begun to be addressed and resolved. Whereas communication and behavioral change strategies have overlapped considerably and have been applied in many sectors to reduce risks to health status (Faber, 1980), controversy continues to exist about the most effective methods for change and the most appropriate level of intervention (Creswell, 1985; Kasl, 1980; Stachnik, Stoffelmayr, & Hoppe, 1983).

Health Risk Appraisal

Health risk appraisal is basically the computation and persuasive communication of personal health risks and has been used with increasing frequency in medical practices, governmental agencies, business and industry, and educational institutions. By October 1982, The Centers for Disease Control in Atlanta had disseminated their Health Risk Appraisal software to 194 agencies and found that the appraisals had been used most often at the worksite and in schools (Hargraves, 1983). In the same year a review of 217 health risk appraisal programs indicated that half were conducted in the workplace followed by programs located in public health departments, colleges and universities, and medical care organizations (Wagner, Berry, Schoenbach, & Graham, 1982).

Intended to raise the level of awareness and knowledge of (a) personal risk factors, (b) their potential

consequences, and (c) the efficacy of health behavior to reduce risk, health risk appraisal has been applied at the individual and group level to motivate the retention or adoption of health behavior (Hyner & Melby, 1985). From an analysis of family history, personal characteristics, and self-reported behavior, the health risk appraisal printout represents a communication about life expectancy which varies in degree of threat for each individual. Health risk appraisal, however, is more than a computer printout; it is a process which has a minimum of three components: an intake questionnaire, a risk estimation procedure, and a written or printed output known as an individual risk appraisal (Goetz & McTyre, 1981). Originally developed as a supplementary tool for use by physicians in the practice of prospective medicine, health risk appraisal was meant to be combined with an interpretive-educational counseling session where recommendations for risk reduction and assistance with behavioral change were provided (Hall & Sheedy, 1980). Shultz (1984) has reported that health risk appraisal has been most effective in motivating behavior change when used in combination with one or more of the following: (a) individual or group counseling, (b) education program, (c) behavior modification, (d) contracting, (c) referral to community resources, (f) educational materials, (g) self-management, and (h) mass media.

Health hazard or risk appraisal was first tested in 1959 with 25 medical students at Temple University under the direction of John Hanlon, M.D., and based on Harvey Geller's system of probability of death tables derived from national mortality statistics (J. H. Hall & Zwemer, 1979). From the use of tables, forms, and instructions to make health risk estimates based on the publication How to Practice Prospective Medicine by Robbins and Hall (1970), the health risk appraisal system has evolved into mass processing of standardized questionnaires via mainframe computers and then into microcomputer-interactive programs (Ellis & Raines, 1983).

Within the past 15 years many versions of health risk appraisal questionnaires have been developed. In an inventory of 29 representative instruments made by the National Health Information Clearinghouse in 1980, Fielding (1982) found great diversity in price, length, scoring, scope, and population applicability among the instruments.

Health risk appraisals instruments vary in the extensiveness of the data collected from the participant and the intended age of use. At one extreme are those instruments used in clinical settings which include complete medical history, blood tests, height, weight, blood pressure, electrocardiography, a physical exam, psychological profiles, and subjective lifestyle reports (D. Hall, 1984; Health 80s, 1983). At the other end of the

continuum are appraisals that focus only on lifestyle and avoid medical assessments (Wellness check, 1982). Although most health risk appraisals such as the Centers for Disease Control 1984 version have been developed for adult populations (Lasco, Moriarty, & Nelson, 1985), a number were created for adolescents and college students (Hettler, 1980; Moody & Moriarty, 1983).

Reliability and Validity

Despite their widespread use, concerns have been voiced regarding the accuracy and predictive ability of the instruments used to assess risks. Controversy has surrounded many of the risk indicators to disease and the level at which these precursors become hazardous. Scientific evidence of the risk of dietary cholesterol, sodium intake, overweight, and lack of exercise has remained in dispute (Hyner & Melby, 1985; Kaplan, 1984; Wagner, Beery, Schoenbach, & Graham, 1982). Accuracy of the derivation and method of combining risk factors has been questioned as well (Goetz, Duff, & Bernstein, 1980; Schoenbach, Wagner, & Karon, 1983). Petosa, Hyner and Melby (1986) have suggested that the combined effect of multiple risk factors is synergistic and that, in using an additive approach, multiple risk factors may be underestimated. In addition, the data bases against which appraisal participants are compared have been criticized as too dissimilar to some subpopulations to make the risk estimates

accurate. Most health risk appraisal instruments are based on actuarial tables from national averages of white, middle-class populations; socioeconomic status, educational level, geographic region, and ethnic background have not generally been included (Imrey & Williams, 1977). Furthermore, the average mortality tables used to predict future chances of dying are by necessity out of date when projecting probability of death 10 years into the future. These 10-year projections are also inadequate for participants under 35 and over 65. Chronic diseases do not usually appear until after age 40 and, therefore, the risk appraisal printouts of youth are likely to show negligible risk to health of current health-compromising behaviors. In contrast since death is quite likely for many within 10 years of age 65, the printout for the aging individual may be unnecessarily alarming (Brothers, 1981; Safer, 1982).

The reliability of health risk appraisal instruments over time was challenged by several recent studies. In a controlled clinical trial of 203 adult subjects, Sacks, Krushat, and Newman (1980) found that only 15% had no logical inconsistency between the responses on a baseline and follow-up health hazard appraisal questionnaire approximately 85 days after the baseline. Responses most frequently changed were miles driven, height, parental age, smoking and drinking behavior, Pap smear history, and age of first intercourse. In a previous study, Best and Milsum

(1977) had discovered that of 21 subjects completing a baseline and follow-up risk appraisal questionnaire 6 months later, individuals reported on the average more than one and a half changes which the authors concluded probably did not occur. Changes in reports of past chronic diseases, the death of parents, and height were but a few of the improbable responses found on the second administration of the appraisal.

Although the apparent lack of reliability of the risk appraisal questionnaires has caused some researchers to express skepticism regarding the use of these instruments (Neutens & Pursley, 1985), others have questioned the data and methodology upon which the estimates were made (Goetz & McTyre, 1981) and the level of accuracy needed for effective use of health risk appraisal. Elias and Dunton (1981) have argued that, although lack of reliability exists in health risk appraisals instruments, for most age groups reliability of responses had a small effect on risk age accuracy. One exception was for the younger participant where even a small unreliability effect in alcohol consumption and mileage would have a large impact on appraisal age. Reliability issues have become more of a problem when the health risk appraisal questionnaire has been used as the dependent measure and readministered to assess change in risk age. Until greater reliability can be presumed, researchers using health risk appraisal scores as pre-post measures of

behavior change should interpret results cautiously (Petosa, Hyner, & Melby, 1986).

Research on the technical characteristics of the health risk appraisal instruments has been in its infancy (Doerr & Hutchins, 1981). Validity and reliablity studies have not kept pace with the proliferation of instruments which vary widely in the data and assumption upon which they are founded. Only recently have researchers addressed the need to improve the quality of the health risk appraisal instrument and the data upon which it is based (D. Moriarty, personal communication, April 23, 1987).

Use of Health Risk Appraisal to Motivate Change

Controlled research studies assessing the efficacy of health risk appraisal to motivate change are presently only embryonic in design and have yielded conflicting results. Initial studies with adult populations have been descriptive in nature or, if experimental, lacked controlled designs. Although positive attitudinal and behavioral responses to health risk appraisal are generally reported in these studies, they lack an adequate basis from which to draw empirical conclusions.

Included among these early research efforts was the use of health risk appraisal at a community health center on a university campus (Milsum, Laszlo, & Price, 1976), with National Aeronautics and Space Administration personnel in the workplace (LaDou, Sherwood, & Hughes, 1979), and with

family practice patients in a clinical setting (Bartlett, Pegues, Shaffer, & Crump, 1983). In all of these studies subjects reported either the intention to make recommeded changes or actual health behavior change within 3 to 12 months of exposure to health risk appraisal. However, high experimental mortality and the unreliability of the behavioral change measures make it difficult to draw accurate inferences from these results. More controlled clinical studies from which more accurate conclusions can be made about the effectiveness of health risk appraisal in motivating adults to change health behavior have been limited in number. From these some positive trends can be noted.

In a study by Johns (1976), 144 volunteer patients at a multispecialty medical clinic in Utah completed the Interhealth Health Risk Appraisal Questionnaire and were assigned to either an interpretive health session with a physician, an interpretive session with a health educator, or to a control group. Ninety of the original sample were then retested with the same questionnaire four months later. Despite a lack of statistical significance, Johns contended that in comparison to the control group who had received no feedback from their health risk appraisal, subjects in the two experimental groups had reduced their risks of dying in the next 10 years by modifying their behaviors. Loss of subjects over the course of the study; a small sample size;

a relatively healthy, predominantly Mormon population; and the length of the follow-up period may have contributed to the lack of statistical significance in this investigation.

Lauzon (1977) evaluated whether exposure to the Health Hazard Appraisal/Evalu*vie stimulated risk-reduction behavior among 293 federal employees in Ontario, Canada. An initial volunteer sample of 346 subjects without current illness or disability between the age of 30 and 55 years was randomly assigned to one of the three groups: (a) control, (b) interpretation only of appraisal results, and (c) interpretation of appraisal and health counseling by a unit nurse. After 12 weeks, the appraisal and supplementary questionnaires were readministered. Although in both experimental groups the appraised age was reduced, the risk appraisal stimulated significant positive changes only in alcohol habits, weight, exercise behavior, breast self-exam, and diastolic blood pressure. Minimal or no change was reported for smoking, seat belt use, systolic blood pressure, rectal exams, and Pap smears. Additionally, health hazard appraisal with counseling was associated with superior results as compared to health hazard appraisal alone regarding alcohol habits, breast self-exam, and appraised age.

Since the sample could be divided by gender and risk level, Lauzon (1977) was also able to assert that greater reduction in alcohol consumption occurred among high risk

subjects, among males between the ages of 30 and 40 years, and among females between 41 and 55 years. The health hazard appraisal was more effective in motivating change in male exercise habits among high risk males and in seatbelt usage of females aged 41 - 55 years. Although this research was a more highly controlled trial than previous studies, the fact that health hazard appraisal scores were used as pretest and posttest measures again makes the results suspect considering the lack of strong reliability data for the health hazard appraisal instruments.

Also using a follow-up design with a group of approximately 700 employees in California, Rodnick (1982) found similar positive results using health hazard appraisal with an hour interpretation session which included explanations of extensive lab tests and physical exams. At the one-year follow-up, 292 individuals volunteered for a retesting. A significant reduction in risk age, i.e. from .6 years younger than their true age to 2.37 years younger ($p < .001$) resulted for men in particular. Young men aged 20 to 24 years reduced their risk age by 6.5 years ($p < .08$), the largest reduction in any age group by gender. Citing the criticisms of the unreliability of the health hazard appraisal instruments, Rodnick (1982) professed support for the unproven conclusion that his data were both relatively valid and reliable; over 80% of the responses to alcohol consumption, smoking, and seat belt use were

consistent from the first testing to the second testing session. However, no control group, self-selected participants, and a multiple component intervention make it impossible to interpret these results accurately.

Health risk appraisal studies that have been conducted with college student populations also contain methodological problems in health risk appraisal research. It has been established that a health education course alone can motivate behavior and attitude changes. McClaran and Sarris (1985) examined the effects of a 6-week health and lifestyle course on the health behaviors, attitudes, and knowledge of 85 undergraduate students during the 1982-82 academic year. For this self-selected group, 74% of which were female, a comparison of pretest and posttest data revealed significant positive changes in eating behavior, alcohol use, exercise, and driving behavior. In addition significant changes were reported for the attitude that one could prevent illness.

A major dilemma in many of the studies has been the lack of objective assessment instruments and the difficulty of separating out the effects of health risk appraisal from those of an intensive health education course. In early studies of health risk appraisal, investigators reported on the students' subjective feelings toward health risk appraisal which was frequently one component of a health education course. Students responded that health risk appraisal was of interest to them, worthwhile, and generally

motivated them to take action (Bensley, 1980; Fenger & Byrd, 1979).

Another typical example is the research by Cottrell and St. Pierre (1983) who investigated the effect of health risk appraisal on behavior change as measured by a questionnaire developed and validated specifically for their study. Participants included 234 undergraduates enrolled in seven health education sections at Pennsylvania State University in the spring of 1981. Three sections served as the experimental group, i.e., health risk appraisal plus health lifestyle course; two sections served as the health lifestyle course only group; and two sections acted as a control.

During the first and last class of an 11-week semester, all students were administered the self-report questionnaire. Only students in the health risk appraisal plus course group completed a Medical Datamation Health Risk Appraisal questionnaire. In the fifth class, print-outs were returned to students, explained in great detail, and utilized in conjunction with discussion of each health risk factor in subsequent classes. Throughout the semester both experimental groups received instruction in the relationship of lifestyle to health and major risk factors while the control group received instruction in human sexuality.

At the end of the semester significant differences were found in health behaviors between the control group and the

two experimental groups; however, there were no significant differences between the health risk appraisal plus lifestyle course and lifestyle course alone groups. Since the course itself was an intensive exploration of lifestyle and risks, virtually duplicating the information supplied by the health risk appraisal questionnaire, it was not surprising that the health behaviors of the two experimental groups were not significantly different. A more effective comparison would have been to assess the differences in health behaviors of students exposed to the health risk appraisal procedure alone with those exposed to a course.

In previous studies, Fultz (1977), M. B. Hall (1979), and Chenoweth (1981) had also reported similar changes in attitude, knowledge, or health behavior for interventions combining health education classes with health risk appraisal. Again whether exposure to health risk appraisal by itself would have resulted in the same changes as exposure to health risk appraisal within the context of the health education course cannot be determined from these studies.

In the few studies assessing the effect of health risk appraisal alone on college student health behaviors, researchers have reported no significant differences in experimental health risk appraisal groups and control groups (Nagelberg, 1981; Wilson, Wingender, Redican, & Hettler, 1980) or a significant difference in only one behavior,

i.e., smoking (Chan & Davis, 1985). Clearly the problems associated with research designs with the college student population and the limited number of controlled studies have made it difficult to assess the utility of health risk appraisal in altering health behaviors.

Recently interest has developed in the effect of health risk appraisal on health beliefs. Using the Health Belief Model, Cioffi (1980) studied the issue of what makes health risk appraisal work by evaluating the effects of the health risk appraisal message or printout on the health beliefs of 97 Blue Cross employees in Georgia. Creating an instrument in accordance with recommended standards for health belief research, Cioffi measured the effects of health risk appraisal feedback within a 30-minute interpretive session and feedback via printed material alone on beliefs about susceptibility to disease, benefits of preventive health behaviors, and general health motivation one month after the health risk appraisal feedback. A control group received no feedback prior to post-testing. In addition, Cioffi examined the association between belief change and (a) level of risk for a specific disease and (b) discrepancy of information received with pre-existing perceptions of susceptibility. No significant change in health beliefs resulted whether subjects received feedback or not. No significant differences were associated with high risk level and beliefs about susceptibility to specific diseases, nor

were significant differences associated with discrepancy of susceptibility views and susceptibility beliefs after treatment. Despite the lack of significant effect on beliefs, the author intimated that the possiblity of a subsequent effect on behavior should not be eliminated. Although health beliefs have been shown to be predictive of health behavior, the failure to change health beliefs does not eliminate the possiblity of a change in behavior (Becker, 1974). One additional finding of interest from this study was that the construct "motivation to control" measured by the Health Locus of Control Scale (Wallston, Wallston, Kaplan, & Maides, 1976), best delineated the high and low risk groups.

Building upon the previous research, Faust, Graves, and Vilnius (1981) studied the effects of three different health hazard appraisals on perceived susceptibility to disease, perceived efficacy of action to prevent heart attacks, and knowledge of risk factors. Eleven Blue Cross and Blue Shield offices in Michigan were allocated to three groups. Out of the 247 eligible employees, 182 volunteered to participate in this study and an additional 75 employees were used as controls. A Health and Attitude Survey specially designed for this project was administered to all participants followed by free blood pressure and serum cholesterol tests, and one of three health hazard appraisals: General Health, Medical Datamation, or the

Centers for Disease Control version. One week after receipt of the report, participants were retested to assess the more immediate impact of the risk appraisal on beliefs. Neither perceived susceptibility to disease nor perceived efficacy of action to prevent heart attacks was significantly changed one week after exposure to printed feedback from either of three health risk appraisals. The one exception was an increased belief in the benefits of exercise, weight control, and medical checkups to prevent heart attack.

Although Faust et al. (1981) and Cioffi (1980) have questioned the impact of health risk appraisal on two specific health beliefs, more research studies with different populations, timing of measurement, and interpretive protocol are necessary before it can be stated with any degree of certainty that health risk appraisal does or does not change beliefs.

The effectiveness of health risk appraisal needs to be fully assessed, particularly in relation to more immediate belief and behavior changes. More empirical evidence is needed to evaluate the impact of this strategy on different age groups and in various settings (Milsum, 1980b). One goal of the current study was to further explore the relationship between health risk appraisal and health beliefs with a college freshman population.

Health Behavior and Beliefs of College Students

In the contemporary Western life cycle, the years between 17 and 22 have been regarded as a transitional period. Levinson (1978) has designated this period as the "early adult transition" in which individuals leave childhood behind and form an adult life structure. The college years have been conceptualized as a mini-life cycle in which certain psychosocial tasks confront students as they progress through their four-year college experience (Blimling & Miltenberger, 1984; Medalie, 1981). Different theorists have previously described these developmental tasks which share many principles in common, e.g., developing autonomy, identity, interpersonal relationships, and purpose (Chickering, 1969; Knefelkamp, 1981; Prince, Miller, & Winston, 1977). As college students explore different identity options, confront constant changes and decision points, and develop new relationships, skills, and interests, rapid shifts in behavior can be expected. As Astin (1977) has pointed out, health behavior has been no exception. It has been shown in recent surveys that health enhancing behaviors not only decrease during the four-year college experience but that freshmen students are entering college with less than optimal health habits.

In longitudinal studies through the Cooperative Institutional Research Program, substantial changes in health behaviors have been reported over a four-year period

for many college students. Over this time period, Astin (1977) noted that drinking of alcohol increased from 27% to 35%, smoking increased by 10%, and taking vitamins declined by 9% in the cohorts that were freshmen in 1969. Larger than average increases in drinking, smoking, gambling, staying up all night, and oversleeping were found among men, Roman Catholics, and students who were highly able, from well-educated families, living in a dormitory, members of a sorority or fraternity, or attending a larger institution. Smaller increases occurred among women, older students, and more religious students. Finally, while increases in smoking were particularly great among younger students, blacks, dormitory residents, fraternity and sorority members, and drinkers, drinking was more likely to increase among men, Catholics, younger students, and smokers.

In more current research an increase in pre-college alcohol and marijuana use, sexual activity, and female smoking behavior has been reported (P. R. Harris, 1981; Lester & Leach, 1983). Furthermore, in a survey of 1,203 students in grades 4 to 11 in two communities from the north central United States, unhealthy food selection, particularly among males, and a low participation rates in out-of-school aerobic activity were reported (Perry, Griffin, & Murray, 1985).

In the most recent survey of the Cooperative Institutional Research Program (Astin, Green, Korn, &

Schalit, 1985), national norms for all freshmen in the fall of 1985 indicated that 9.1% had smoked cigarettes (11.3% females, 6.6% males), 66.5% had drunk beer, and 74.3% had stayed up all night during the past year. Only approximately 50% rated themselves above average in emotional and physical health.

A lifestyle of increased health compromising behaviors among adolescents and entry-level students coupled with the rapid change in a hedonistic direction of health behaviors during the college years can result in a situation wherein the health status of college students is increasingly endangered. These health-compromising behaviors and the high level of emotional distress reported by today's freshmen (Koplik & DeVito, 1986) have created the potential for serious health problems in the near and distant future.

In addition to this long-term risk of chronic disease, health-compromising behaviors among college students have been correlated with more immediate health-related consequences. Furthermore, college student health behaviors may be intercorrelated, and unlike adult health behavior, constitute a syndrome or lifestyle not unlike that identified by Jessor (1984) with younger adolescents.

Taylor and McKillip (1980) found evidence that personal habits were associated with the perception of illness and with the frequency of use of medical services on campus. In a survey of 400 students at Southern Illinois University,

cigarette smoking, coffee consumption, and work correlated positively, and adequate sleep and exercise correlated negatively ($p < .05$) with perceived illness. Furthermore, cigarette smoking, alcohol use, coffee consumption, sexual activity, and overweight correlated positively, and exercise correlated negatively with use of medical services. Through a factor analysis procedure, three lifestyles were identified, i.e., stressful, hedonic, and studious; health-compromising behaviors were more highly correlated with the stressful and hedonic lifestyles of students.

In student surveys at different institutions similarities in health behaviors, interests, and expressed needs among college students have been revealed. At Stanford University an analysis of perceived health behavior and interests indicated that weight and eating problems, smoking, substance use, nonexercise, and emotional distress were important areas of concern (Chervin & Martinez, 1984). Health behavior issues of concern at the University of Maryland included exercise, stress, contraception, nutrition, and weight control (Downey, 1984). Eating habits, weight control, exercise, smoking, and alcohol use were the five major health risks identified in an analysis of a health risk appraisal given to 999 freshmen at the University of Arkansas (Guyton & Marty, 1985).

From these surveys it is evident that alcohol and substance use, cigarette smoking, eating behavior, and

sexual activity are among the major health risks for the college age population. Moreover, the risks of death or disability associated with motor vehicle and other accidents are well documented for the 15 - 24 years age range (National Center for Health Statistics, 1981).

Alcohol and Substance Use

An increase in alcohol and substance use of college students has been cited in the literature (Blane & Hewitt, 1977; Nicholi, 1983, 1984a, 1984b, 1985). In a study in Canada, high school students also indicated a significant increase in the use of alcohol and drugs from 1981 to 1983 (Altorf, 1985). Although it has been difficult to measure the extent of use with any accuracy, especially with illegal drugs, Nicholi (1985) has asserted that, based in a review of literature, a vast majority of the college student population have experimented with alcohol and recreational drugs. Responses on yearly surveys at the University of Massachusetts have indicated that approximately 80% of the students drink at least once a month (Duston, Kraft, & Laworskt, 1981).

In an anonymous survey of over 900 students at the University of Illinois in 1982, Valois (1986) observed that 56.2% of the students used alcohol weekly or daily, with 20.3% using alcohol monthly; 19.4% used marijuana weekly or daily, while 13.4% used it monthly. In addition, 23.6% used nicotine and 80.7% used caffeine on a weekly or daily basis,

while 2.4% used nicotine and 3.4% used caffeine monthly. Alcohol, marijuana, nicotine, and caffeine were clearly the most frequently used drugs in this representative sample.

In a New England college during the 1976-1977 academic year, a stratified sample of 195 students representative of the college population was interviewed about alcohol use (Hashway, Hesse, Nutile, & Taylor, 1980). Students differed in their reasons for drinking, in their classification of drinking types, in their location for drinking, and in their reasons for not drinking. The researchers determined that the major reasons for drinking were to relieve academic tension and social tension. The two types of drinkers identified were intimate and group drinkers. The environments in which students drank included dormitory, athletic events, concerts, and on-campus grounds for group drinkers; in apartments, homes of friends, or with parents for intimate drinkers; and in bars, taverns, and restaurants for the formal drinker. The reason for not drinking was a general dislike for the effect of alcohol.

If college students are learning to use alcohol to relieve stress rather than a health promoting alternative, the long-term consequences may be a lack of effective coping skills in adult life and greater risk for premature death due to traffic fatality or cirrhosis of the liver.
In addition to these health risks associated with the use of a legal substance, alcohol, college students are

particularly vulnerable to the health risks associated with the use of illegal substances, e.g., marijuana and cocaine, and the illegal use of sedatives and tranquilizers.

Research on the adverse biological and psychologial effects of marijuana and estimates that 21 million students have used the substance and several millions smoke it daily, also have implications for the present and future health status of this age group (Nicholi, 1983). In reviewing past research, Nicholi (1983) made the following observations on the long- and short-term effects of marijuana use on college students. Moderate doses of the drug have been found to impair reading ability; the capacity to acquire, store, and recall information; and communication skill. In addition, motor coordination, particularly driving skills; concentration; and judgment have also been impaired. Although long-term effects remain unclear, impairment of lung function, reproductive functions in both males and females, birth defects, and mental disorder have also been linked to regular usage.

An increase in cocaine, sedative, and tranquilizer use among college students has also been documented (Nicholi, 1984a, 1984b). Within the college-age group the reported use of cocaine has increased from approximately 9 million in 1972 to over 33 million in 1982; the reported use of sedatives has grown from 10% in 1972 to 18.6% in 1982; and the use of tranquilizers from 7.0% to 14.8% (Miller & Cisin,

1982). Adverse biological and psychological effects have also been associated with these drugs which are a large part of the college scene. Belief in the harmlessness of these substances, peer sanction, and a desire to feel better are among the strongest reasons for their prevalence among college students (Cafferata, 1980; Nicholi, 1984a).

Cigarette Smoking

Smoking cigarettes has been another health-compromising behavior, especially for college women. In an assessment of smoking behavior among 7,016 students in 34 New England colleges, 32% of the males and 44% of the females reported smoking cigarettes (Wechsler & Gottlieb, 1979). In addition, smoking for both sexes was significantly related to perceived health status; heavier smokers reported the poorest health status.

Page and Gold (1983) have speculated that smoking patterns between males and females may be a function of systematic gender differences. In a study of 221 students at Southern Illinois University at Carbondale, significant gender differences on beliefs were found. Females were more likely than males to believe that smoking left a bad odor on clothing, increased their dependency on cigarettes, and helped control their weight. Males were more likely than females to believe that smoking helped them to concentrate. Females also were more likely to believe that doctors and nonsmokers thought that they should avoid smoking and were

more willing than males to comply with the wishes of their mothers, important others, and doctors.

In another study investigating the effect of beliefs of college women on smoking, Gottlieb (1983) reported that in a sample of 953 college women from four colleges in the Boston area, 86.1% had begun smoking before entering college and were primarily motivated to smoke because smoking helped them to manage stress associated with school work, social situation, and jobs. Furthermore, over half stated that pregnancy, an easy way to quit, and definite proof of their personal vulnerability to lung cancer would definitely motivate them to quit. Former smokers indicated that they quit smoking primarily for health reasons, dislike of loss of control of their lives, and social effects; former smokers were also most likely to believe that smoking was a serious health risk than current smokers. Results of this research support the Health Belief Model in that susceptibility to a threatening consequence was a factor in motivating college women to quit smoking.

In addition to smoking cigarettes in an attempt to control weight and deal with excess stress, college females may also be vulnerable to abusing food for the same reasons. In charge of their own eating habits and with access to unlimited quantities of food for perhaps the first time in their lives, college women may develop unhealthy eating patterns and weight control methods (Greene, 1986).

Weight Control

Estimates have been made that between 5% and 25% of all college-age women engage in the binging-purging cycle known as bulimia (Blimling & Miltenberger, 1984). Although reliable statistics are lacking, experts such as Elizabeth S. Ohlrich, Medical Director of the University of Wisconsin Eating Disorders Program in Madison have asserted that the prevalence of both bulimia and anorexia nervosa has been increasing on college campuses (Greene, 1986). Used as a tension release and weight control method for young women, bulimia-type behavior has serious long-term health consequences.

A separate yet related bulimic-like syndrome, "fad bulimia," has also been observed on college campuses and may be more prevalent than clinically diagnosed eating disorders (Cesari, 1986). Although "fad bulimia" involves less intense and more public eating behavior, it is a serious concern because some students participating in frequent binge-purge behaviors are candidates for a life-threatneing clinical bulimic disorder in the future.

Although all forms of substance use create potential health problems for college students, perception of the seriousness of these problems has been found to vary between students and health professionals on college campuses. In a mental health needs assessment of 457 undergraduate and graduate students at Memphis State University, the top three

mental-health problems reported as most serious for this random and representative sample were alcohol abuse, smoking, and drug abuse; coping with stress and weight control ranked 7th and 11th respectively (Henggeler, Sallis, & Cooper, 1980). In contrast, rankings by 30 mental health professionals on campus differed considerably from those of students. From their viewpoint career choices, academic difficulties, and coping with stress were the top three problems, and substance use and weight control problems were ranked much lower. This discrepancy in perspective may account for inappropriate and ineffective programming and service provision in many college campuses. A direct assessment of student health behaviors and expressed needs has led to more relevant health promotional efforts in a number of college communities (Hettler, 1980).

Health risks associated with sexual activity have also been perceived as less critical by health professionals than by students (Henggeler, Sallis, & Cooper, 1980). Sexually transmitted diseases and unplanned pregnancies are two risks to the physical and mental health status of college students increased by the frequency and variety of sexual contacts on college campuses.

Sexual Activity

Sexual activity among college students has created additional threats to health. Cases of chlamydia and herpes genitalis have become increasingly prevalent on college

campuses. Estimates have been that 10% of students are infected with chlamydia and that a significantly higher incidence of herpes has been found among college students than for the general population (T. J. Meyer, 1985; NIAID Study Group, 1980).

In a study of 416 minority students at an undergraduate college in New York City, analysis of a questionnaire assessing health beliefs and venereal disease preventive behaviors showed that, of those responding to this item (N=358), 70% had never received asymptomatic checkups for venereal disease, 24% went for checkups every 9 - 12 months, and 13.7% went every 3 - 6 months for checkups (Simon & Das, 1984). A direct relationship between perceived susceptibiltiy to venereal disease and perceived benefits of taking active and frequent asymptomatic checkups was noted. Those students who perceived barriers as minimal also were more likely to seek preventive medical care. Of the entire sample, only two-thirds believed that they were at risk if they or their partner douched after intercourse or were always clean; one-quarter were concerned about pain, embarrassment, and confidentiality when seeking a venereal disease checkup. Approximately 25 - 40 % of the sample were uncertain or disagreed that certain recommended preventive actions were useful in controlling and preventing venereal disease. Although this sample was not representative of the traditional college-age population, these subjects clearly

indicated which personal beliefs hampered the adoption of health behaviors related to their sexual activity.

Despite widespread publicity about the seriousness of the AIDS epidemic and the need to modify sexual behavior to control the spread of this infectious disease, college students have also continued to believe that they are immune to this threat (Biemiller, 1987a). In a survey of 13,000 students at Stanford University, 74% reported that they did not discuss sexually tranmitted diseases (STD's) with partners before engaging in sexual intercourse, and 25% of the students did not know what "safe sex" practices were (Hirschorn, 1987). Furthermore, at the University of Texas, Austin, 50% of the students surveyed revealed that AIDS had no effect on their sexual behavior.

Although students are increasingly aware of the dangers of AIDS and other STD's, peer pressure to be sexual coupled with the use of alcohol and drugs has continued to promote sexual promiscuity among many college-age students. In addition, the fear of breach of confidentiality and of mislabeling as homosexual have prevented students from seeking protection or from changing their sexual behavior (Biemiller, 1987b).

Beliefs concerning susceptibility to pregnancy and the benefits and barriers of contraception use have also been associated with adequate and inadequate use of birth control among college students (Hester & Macrina, 1985). In a

sample of 171 female students seeking care at a family planning clinic at the University of Illinois, 50.5% employed effective use of contraceptives; 49.4% employed ineffective use and were either inconsistent in their use (52.4%), relied upon unreliable methods (28.6%), or failed to use any method (16.7%). None of the women in the sample were attempting to get pregnant at the time. The variables most predictive of adequate contraceptive behavior were perceived benefits and barriers and perceived susceptibility. Inadequate users were more embarrassed to obtain birth control, believed that it interfered more with enjoyment, and perceived it as more of an inconvenience than adequate users. Adequate users believed that benefits out-weighed the costs.

The seriousness of this inadequate use of contraceptives can be clearly seen when national estimates of pregnancy rates on college campuses are considered. Pregnancy rates have been conservatively estimated at between 6% and 10%, an increase from 5 - 6% in the early 1970s, and the number of women who terminate these pregnancies has been approximately 90% (Dorman, 1981). Ineffective contraceptive use was found to be the primary reason for pregnancy. Once again in support of the Health Belief Model, beliefs concerning susceptibility and in this case, benefits and barriers, were significantly related to a health behavior, i.e., adequate use of contraception.

In a more recent assessment at the University of Arizona, Price, Shawn, and LaViola (1985) found that out of 515 students who returned the questionnaire, 79% were sexually active and 20% used no birth control. Although pregnancy may not constitute a risk to physical health, emotionally and socially it poses a threat to many young women and the choice to terminate a pregnancy also poses similar threats.

Although free from the direct health risks associated with unplanned pregnancy, young males are more vulnerable than female college students to the risks of death or disability caused by motor vehicle and other accidents (Matarazzo, 1984).

Motor Vehicle and Other Accidents

Motor vehicle and non-motor vehicle accidents also threaten the health of college students. Among the major threats to life and health, accidents are the greatest cause of morbidity and mortality for individuals under 45 years of age, and the highest rates of fatal accidents occur in the late teenage to young adulthood years (National Center for Health Statistics, 1981). In the 15 - 24 years age range, males have a 372% higher rate of fatal injuries than females in that age group (National Center for Health Statistics, 1978). Although the theory of accident proneness has been discounted, the lifestyle and life events of certain

populations places them at higher than average risk (Rivara, 1984).

The extent to which students drove automobiles while under the influence of either alcohol or marijuana was revealed in a recent study by Valois (1986). Driving while drinking alcohol was reported by 15.8% on a weekly-daily basis, 19.9% on a monthly basis, and 28.1% less than 10 times per year. Using marijuana and driving was reported by 6.3% on a weekly-daily basis, 9.2% on a monthly basis, and 18.6% less than 10 times per year. Twice as many males as females admitted to driving while using either alcohol or marijuana. Significant associations between regular use of these substances and moving traffic violations and accidents were also discovered.

Beck (1981) explored this association between alcohol use and driving in a survey of 272 college students enrolled in various health education classes and consisting of a high percentage of seniors, 39.7%, and behavioral-social science majors, 40.3%. Both drinking-driving intentions and actual behavior were significantly related to the beliefs that one could effectively avoid getting caught by the police and avoid causing an accident while under the influence of alcohol. Beck concluded that the erroneous belief by students that they can control the threatening consequences and be a safe driver while drinking was significantly

related to the prevalence of drinking and driving in this population.

Accidents other than motor vehicle accidents are also a leading cause of death for the college-age population and multiple life changes within short periods of time have been associated with vulnerability to accident and injury. From a study of 241 college-age males at a southern university, Furney (1983) presented evidence that an increase in life change events was associated with increased accident rates. Numbers of accidents of varying levels of severity were assessed over a 12-week period and the accident rate of those scoring in the upper and lower 27% on a life change events questionnaire were compared. A significantly higher rate of accidents was associated with high scores on the College Schedule of Recent Experience. Although no one theory of accident causation exists, generally the inability to respond appropriately to hazardous situations has been linked to the incidence of accidents. The use of substances and high levels of stress have been known to increase an individual's susceptibility to accidents (Rivera, 1984).

In reviewing the literature on the health behavior and beliefs of college students, it has become evident that we are witnessing an increase in health-compromising behaviors and a sense of invulnerability to the risks associated with these behaviors. Within this population, alcohol and

recreational drug use has increased, as well as the number of traffic accidents associated with this substance use; the percentage of college students, particularly women, who are smoking and abusing food has grown in the past five years; and the increase in sexual activity without a subsequent increase in the use of contraception has led to higher rates of sexually transmitted disease and unwanted pregnancy.

It has become apparent that a reduction of health risks is necessary to prevent short- and long-term premature losses of functional ability and of life among college students. Efforts to change health beliefs and increase health behaviors in this population have ranged from traditional instruction in health education to campus-wide health promotion programs.

Health Behavior Change Strategies on College Campuses

From their inception in 1818 at Harvard College, health education classes have traditionally been the primary strategy for influencing the health beliefs and behaviors of college students. However, since its enthusiastic acceptance in the 19th century, over time health education has lost credibility and support in higher education.

From a survey of schools which offer health education courses, Kittleson and Ragon (1984) found that only 13 required a course for graduation, 15 offered a health course as an elective, and 88 required a course for majors in either health, physical education, or education. The fact

that enrollment in these courses has been voluntary and that "only 10.7% of the universities in the United States require general health eduction of all its students for graduation" (Kittleson & Ragon, 1984, p. 92) has limited the impact of health education on college campuses.

Despite the limited number of college students receiving formal health instruction, health educators have increasingly applied behavioral techniques in their classes in an attempt to more effectively motivate the adoption of health behaviors. Behavioral assessment, behavioral contracting, and the designing and implementation of individual behavior change projects have been incorporated with varying degrees of success in health education courses (McClaran, & Sarris, 1985; Melby, 1986; Petosa, 1984).

Increasingly, health promotion and education programs have been sponsored by student health services on a campus-wide basis. Since most college health services are prepaid plans where costs are spread over the entire student body, it has become feasible to offer a broad scope of organized health education programs (Zapka & Love, 1985). A survey of 158 American College Health Association Member institutions revealed that the most extensively sponsored programs included (a) contraception and weight reduction (64%), (b) blood pressure check (62%), (c) breast self-exam (55.7%), (d) first aid/CPR (54.4%), (e) nutrition (53.2%), (f) alcohol use (51.3%), (g) stress management (49.4%), and (h)

sexuality (39.9%) (Chervin & Sloane, 1985). The type and extent of programming has varied greatly among institutions with the large four-year universities generally offering more programs.

A major trend in health promotion in higher education has been the establishment of institutional commitment to organized and coordinated programming involving the collaborative efforts of academic departments, student health and mental health services, and the student life division (Zapka & Love, 1985). In the past 20 years a philosophy of student development has emerged wherein students are viewed more as whole persons needing emotional, social, psychomotor, and spiritual growth as well as intellectual development (Opatz, 1985). A number of institutions have established programs focusing on total development and optimal well-being. A key element to these programs has been student participation in planning and implementation. Along with administration and clinical advisement, student health councils and intern and practicum students from various academic departments have provided direction and leadership to these comprehensive health promotion programs (Chandler, 1979).

In a survey of wellness and health lifestyle centers on college campuses, Barth and Johnson (1983) found that out of 107 responsés only 12.8% were operating such centers on their campuses. In addition, 56% of the personnel involved

were student health center staff and 44% were faculty-related positions. For a majority of the respondents, the student health center was the organizational home of the center. Although the campus health center has been perceived as the most obvious and appropriate location for the health promotion efforts, particularly in a small college campus (Parker, 1985), campus-wide programs including all facets of the community such as the one at the University of Wisconsin, Stevens Point, have been advocated (Hettler, 1980).

Using a model by Allen (1981) which emphasizes environmental modification and cultural support for successful health behavior change, William Hettler, M.D., launched the first comprehensive wellness program on a university campus in 1972. In implementing this model, Hettler and the Student Life Division of the university mobilized the student affairs and residence hall staff, food service staff, health center personnel, counseling center staff, interested faculty, students, and administrators to establish a supportive environment for attitude and behavior change. The guiding philosophy of this lifestyle improvement model was the pursuit of high-level wellness in six dimensions: (a) intellectual, (b) emotional, (c) physical fitness and nutrition, (d) social, (e) occupational, and (f) spiritual.

Although the number of campus-wide health education programs for students has grown, comprehensive programs like the one at the University of Wisconsin are less common than those which focus on a limited number of topics or delivery systems. Taylor (1981) found that fewer than 7% of colleges surveyed offered a campus-wide health education program. Frequently based on assessed needs and interests, these more limited programs have included workshops, lectures, mass media displays and demonstrations in such areas as stress management, weight control, fitness, nutrition, sexuality, substance use, and interpersonal relationships (American College Health Association, 1984).

A survey of the evaluation of these programs has shown that limited time, staff, expertise, and budget have restricted evaluation efforts and have led to a reliance on process evaluation designs and satisfaction surveys. In a survey of 158 colleges and universities of which 29% used health risk apraisals, only 4.3% used an outcome evaluation to assess the effectiveness of this strategy on their campus (Chervin & Sloane, 1985). Rigorous outcome evaluation, longitudinal studies, and comparative designs have been underutilized and effects "measured in behavior change are practically never used by college health educators" (Chervin & Sloane, 1985, p. 207).

Summary

From a review of the research, it is evident that health behaviors are complex, unstable, multidimensional, and a function of multiple factors. Although positive changes in adult health behavior have been documented, a review of the literature has indicated that the health behavior of adolescents and young adults is compromised in an attempt to meet other needs, e.g., peer approval, autonomy, and stress management. In addition, their belief in personal invulnerability to accident or disease reduces the motivation to protect against any threat to health. According to epidemiological research upon which health risk appraisal is based, this neglect of health behavior at a younger age increases the immediate risk of death due to accidents and violence and increases the long term risks of premature death or disability due to chronic diseases.

Both active and passive strategies to change health behavior have been studied with mixed results. Attitude and behavioral change strategies have been used in an attempt to motivate people of all ages to take a more responsible and active role in maintaining their present and future health status. Although health behavior change as a consequence of mass media, educational, and behavioral methods has been reported, researchers have observed that the maintenance of change has been limited.

In a state of rapid transition, college students have been identified as a population at risk for experiencing the short- and long-term consequence of substance abuse, casual sexual actitity, lack of seat belt use, sedentary lifestyles, and poor dietary habits. Strategies to motivate the adoption or retention of health behavior in this population have ranged from traditional health education classes to comprehensive health promotion programs.

There has been moderate support in the literature for the use of health risk appraisal with college students. From the Health Belief Model perspective this health behavior change strategy has the potential to modify beliefs about susceptibility to illness and the benefits and barriers to taking action in such a way as to increase the likelihood that a student will adopt or retain a health behavior. Although health risk appraisal has been used successfully within the context of a health education class, the effects of this strategy outside of a supportive classroom setting have been less well researched.

CHAPTER III
METHODOLOGY

This study was designed to determine if involvement in the Health Risk Appraisal process affected the health beliefs and behaviors of college freshmen who had different initial levels of health risk. Of interest was the immediate impact of the Health Risk Appraisal process on the health behaviors assessed by the Martin Index of Health Behavior and on three dimensions of the Health Belief Model, i.e., perceived susceptibility to illness or accidents, perceived efficacy of health behaviors to reduce health risks, and perceived self-efficacy to perform health behaviors.

The design, population and sample, treatment, dependent variables, procedures, and data analyses used in the study are described in this chapter.

Design of the Study

A randomized, pretest-posttest control/comparison group design (McMillan & Schumacker, 1984), shown in Figure 1, was used in this study.

This design controlled for all threats to internal validity except an uneven dropout rate; a diffusion of treatments, e.g., roommates communicating with each other; and experimenter bias. Although Cioffi (1980) had provided

some evidence that beliefs were not affected by mere exposure to a health risk appraisal questionnaire, external validity may have been affected by the interaction of pretesting, selection, and/or history with the treatment or by the reactive effects of the experimental procedure itself (Isaac & Michael, 1981).

R	O1	X1	O2
R	O1	X2	O2
R	O1		O2

R = stratified random assignment to treatment
O1 = observations of health behaviors and beliefs 2 - 12 weeks prior to treatment
X1 = 60 - 75 minute Health Risk Appraisal process sessions
X2 = 60 - 75 minute Health Information sessions
O2 = observations of health behaviors and beliefs 3 - 4 weeks following treatments

Figure 1. Randomized, pretest-posttest control/comparison group design

The major advantage of this design was that it allowed for a direct assessment of change in both belief and behavior scores. As a true experimental design, this extension of the basic pretest-posttest control group design maximized internal validity and, where statistically significant differences resulted, provided evidence that the independent variables, not other sources, produced the assessed results.

Population and Sample

College freshmen enrolled in Eckerd College, a four-year, private protestant college, located on the west coast of Florida, were the population from which the sample was drawn for this study. During their first week on campus in the 1986 autumn term (a three-week orientation term beginning in mid-August), the entire incoming freshmen class attended a required introductory session where they were invited to participate in the study. As each student entered the auditorium, he or she was handed a large envelope containing a control card, informed consent form, and three questionnaires. The informed consent form (see Appendix E) was signed by those students agreeing to participate. Although this group of 243 students comprised the initial sample, the final sample consisted of 101 students. A loss of 142 subjects or 58% of the initial pool resulted.

The mean age of the actual sample was 17.9 years, with a mean appraised health risk age of 20.9 years (see Table 1), somewhat older than expected for this young and basically healthy group of students. Actual ages ranged from 17 through 21 years and appraised health risk ages from 17 through 36.7 years. Males comprised 44% and females 56% of the sample. Of these 101 subjects, 56% were classified in the average health risk category and 44% in the high health risk category. Initially, 81, 82, and 80 subjects

were randomly assigned to the treatment, comparison, and control groups, respectively, but the actual number of students who completed all phases of the study in each group was 37, 28, and 36, respectively.

Table 1

Demographic and Appraised Health Characteristics of Sample

Variable	N	Mean	SD	Range
Actual Age	101	17.9	0.77	17 - 21.0
Appraised Age	101	20.9	4.55	17 - 36.7
Health Risk Level				
Average	57			
High	44			
Gender				
Male	44			
Female	57			

Procedures

During the introductory session, those students who signed the informed consent form immediately completed and returned the following items in the sequence as indicated:

1. Health Belief questionnaire
2. Health Behavior questionnaire
3. Health Risk Appraisal questionnaire

To protect confidentiality, yet provide for assignment to groups and followup, a control card with a code number and a line for the student's name plus a detachable "claim check" number were both attached to the coded packet of

questionnaires. Students were advised that this information would be kept confidential within legal limits and that the researcher would be the only person to have access to the control cards used only to notify students of their feedback group meetings through campus mail and resident advisors. All control cards were destroyed at the end of the study.

Students were instructed to fill in their name on the control card, detach and save their "claim check" number as a back-up system to insure the return of the correct feedback information, and to fill out the three questionnaires in order. They were also told to place both their informed consent form and control card in the attached envelope and to pass this envelope to the end of each aisle where faculty mentors collected and immediately deposited them into a large box in the front of the auditorium. The three questionnaires were placed in the larger packet envelope and collected in the same manner.

Following this session, all Health Risk Appraisal questionnaires were computer scored, and subjects were then categorized into high and average health risk level groups. No students were below average in their health risk. The high risk group consisted of all subjects whose appraised age was two or more years greater than their actual age. The average risk group included all subjects whose appraised age was within two years of their actual age. To insure

equal distribution of males and females within each risk level group, subjects were divided by gender.

A stratified random assignment by risk level and gender to three treatment conditions followed. From a list of students in each risk level gender group, the researcher began at a random place in the list and assigned subjects consecutively to Health Group One, the Health Risk Appraisal process session (treatment); Health Group Two, the Health Information session (comparison); and Health Group Three, no session (control). The number of subjects assigned to Group One, Group Two, and Group Three was 81, 82, and 80, respectively.

Within 10 days of the initial assessment students were notified both through campus mail and by classroom teachers of their group designation and of their scheduled health group session (see Appendix D). Students missing the first opportunity to attend a health group session were notified verbally by resident advisors and in writing through campus mail of future meetings held in dormitory lounges.

Treatment

To insure consistency in the quality of the delivery of the treatments and in the content presented among the health groups, all Health Group One and Health Group Two sessions were video or audio taped and rated by a panel of three experts from the faculty of Eckerd College (see Appendix F). For the Health Group One sessions there was a 91% agreement

among the raters on the quality of the speaker's delivery and a 99% agreement on the inclusion of topics and exercises in the content of the sessions For Health Group Two sessions, an 88% agreement among raters on the quality of delivery and a 99% agreement on inclusion of topics and exercises resulted from the ratings. For all of the health group sessions combined there was a 90% agreement among the three raters on the overall quality of the delivery and on the content included.

Health Group One (Health Risk Appraisal Process)

Subjects assigned to this group attended either a 75-minute interpretive-educational session held in a large classroom and scheduled 12 days after the initial testing date or a 60-minute interpretive-educational session, covering the same material at a faster pace, in the dormitory complex lounge and scheduled within 10 weeks of the initial testing date. It was necessary to schedule two additional Health Group One sessions in the residence halls to increase the sample size for this group to 37 subjects.

During this session the researcher returned computer printouts of the Health Risk Appraisal questionnaires to each individual and interpreted the contents of the printout. In addition, health information was presented, recommendations were made for health risk reduction and the adoption or retention of health behaviors, and a resource and referral booklet was disseminated. Three weeks after

each session, the Health Beliefs and Health Behaviors questionnaires were distributed to each student to complete and collected by resident advisors and work scholars.

Health Group Two (Health Information)

This group also attended either a 75-minute educational session held in a large classroom and scheduled 12 days after the initial testing date or a 60-minute educational session, covering the same material at a faster pace, in the dormitory complex lounge and scheduled within 12 weeks of the initial testing date. It was necessary to schedule three additional Health Group Two sessions in the residence halls to increase the sample size for this group to 28 subjects. The researcher only presented health information, made recommendations for health risk reduction and the adoption or retention of health behaviors, and disseminated the resource and referral booklet. No feedback from the Health Risk Appraisal questionnaire was given to subjects at that time. Three weeks after each session, the Health Beliefs and Health Behaviors questionnaires were distributed to each student to complete and collected by resident advisors and work scholars. These same individuals were then offered an opportunity to meet in another group session to receive their Health Risk Appraisal printout and an interpretation of the results.

Health Group Three (Control)

This group did not attend an educational session or receive feedback from their Health Risk Appraisal questionnaire until after they had received, completed, and returned the two health questionnaires which were also distributed and collected by resident advisors and work scholars between 5 and 12 weeks after the initial testing. It was necessary to extend the deadline for return of posttest questionnaires to increase the sample size of Health Group Three to 36 subjects. These students were then offered an opportunity to meet in a group session to review results from their Health Risk Appraisal questionnaire and receive health risk reduction information and material.

Instruments: Dependent Variables

The difficulties associated with measurement of health behaviors and beliefs are discussed in this section and the instruments used to measure these dependent variables are described.

Health Behaviors

Since most health behaviors cannot be easily observed on enough occasions to result in reliable data, the most common approaches to measuring health behaviors are self-reported responses to questions on inventories, checklists, and questionnaires (Kirscht, 1983). The development of valid and reliable standardized instruments, however, has lagged behind the needs of researchers in this field

(Feuerstein, Labbe, & Kuczmierczyk, 1986). When scales are designed, intra- and inter-scale analyses are seldom presented; items are frequently lengthy, complicated, or a mixture of Likert-type, yes/no, and open-ended questions; and either apply to one particular health behavior or encompass a wide array of behaviors, attitudes, and values (Elder, Artz, Beaudin, Carleton, Lasater, Peterson, Rodrigues, Guadagnoli, & Velicer, 1985).

In 1981, Heaton was able to locate only nine instruments developed since 1940 to measure health behaviors. Most of these were currently out-of-print, obsolete, lengthy (over 100 items), or actually tests of knowledge rather than behavior. Encompassing 10 areas of health behaviors, Heaton (1981) also designed a comprehensive Health Behavior Inventory for college students, established content and concurrent validity, and calculated reliability, i.e., split-half, at .63 for his instrument of 78 items.

Shorter in length and more narrowly focused on behaviors assessed in the Health Risk Appraisal questionnaire, the Martin Index of Health Behavior was used in this study. A more recently developed and appropriate instrument, the Martin Index of Health Behavior was a 25-item, multiple choice questionnaire which generated interval data (J. Petersen-Martin, personal communication, May 12, 1986). For each of the 25 items, scores ranged from 0

through 3, and the entire range of possible scores for the index was 0 through 75; the higher numbers indicated more positive health behaviors. The index included only health behaviors over which an individual had choice and control and which represented the following areas: nutrition, weight control, sleep, auto safety, substance use, exercise, mental health, medical checkups, sexuality, and personal body-care.

To establish initial content validity for this instrument, a panel of experts had rated the relevance of the items to the intended concept, i.e., health behaviors. Items were included which measured (a) the seven health habits contributing to health status as identified by Belloc and Breslow (1972); (b) stress reduction, nutrition, self-exam, and exercise behaviors from an instrument developed for a Health Risk Appraisal study (Cottrell & St. Pierre, 1983); and (c) sexuality, consumer health, and mental health behaviors from the comprehensive instrument by Heaton (1981) designed for a college student population. Including several items for each substrata of health behavior, this instrument was an adequate sampling of health behaviors for the population sampled in this study.

A test-retest, reliability coefficient of .85 had been reported by the author. In this study, a reliability coefficient of .84 was found which supported Martin's findings. Since previous researchers had indicated that

consistency among health behaviors was not evident (Harris & Guten, 1979; Matarazzo, 1984), the internal consistency of this instrument was not assessed either in previous studies or in this one.

Health Beliefs

Even more problematic to measure than health behaviors were the three dimensions of the Health Belief Model, i.e., perceived susceptibility to illness or accidents, perceived benefits of health behavior to reduce risks, and perceived barriers to taking action, specifically self-efficacy to perform health behaviors. Attention has only recently been given to the reliability and validity of measurement of the Health Belief Model dimensions, and a real need to refine and standardize instruments has existed (Janz & Becker, 1984). Most investigators have developed their own approach to operationalizing the dimensions and, consequently, an excess of different items measuring the same beliefs has resulted (Jette, Cummings, Brock, Phelps, & Naessens, 1981).

Maiman, Becker, Kirscht, Haefner, and Drachman (1977) were the first to directly test the reliability of the indices of the Health Belief Model dimensions and found that data substantiated independence of the three major dimension, i.e., threat, benefits, and barriers. Findings for internal consistency coefficients were above .90 for some indices of susceptibility, severity, and combined indices of general health threat and well above .80 for

indices measuring susceptibility and severity of eight specific health threats. For perceived benefits and barriers, the internal consistency coefficients fell into a relatively lower range (.47 - .51).

For two adult samples in Michigan, Jette, Cummings, Brock, Phelps, and Naessens (1981) used an exploratory factor analysis to identify the underlying structure of 31 health belief questionnaire items, excluding the benefits dimension. Eight factors emerged which accounted for 37% of the total variance. The general health threat factor included questions about susceptibility to and severity of illness, and the measure of general barriers remained as a single-item measure, different from situation-specific barriers. Index reliability coefficients ranged from .38 - .77 for this sample. The authors concluded that discrete Health Belief Model dimensions do exist and that "questions traditionally used in Health Belief Model studies to measure the same beliefs do factor on the same underlying belief" (Jette et al., 1981, p.90). However, caution in mixing general and specific questionniare items in the same index was advised.

In this study, the health beliefs variable was subdivided into three beliefs, each of which was measured separately. Perceived susceptibility to illness or accident and perceived efficacy of health behavior to reduce risks were measured by two indices on a Health Belief

were measured by two indices on a Health Belief Questionnaire developed by Cioffi (1980) and modified by the investigator according to standards for health belief measurement cited by Maiman et al. (1977). Possible scores on the perceived susceptibility index ranged from 10 through 78 with a high score interpreted as greater perception of susceptibility to future disease or accident. Scores on the perceived efficacy index ranged from 24 through 156 with a high score indicating a greater perception of the efficacy of behavior to reduce health risks. The content validity of these two indices had been evaluated by three nationally recognized experts in either Health Belief Model research or health risk appraisal research. A rating of six or above on a 9-point scale on clarity and accuracy of item to measure tninee health belief dimension had been required for inclusion of an item in the questionnaire.

Based on a pilot test of the instrument with 59 adults, internal consistency coefficients for the perceived susceptibility and perceived efficacy of prevention indices had been calculated at .87 and .85 respectively, and stability coefficients (test-retest) for the former index had been determined to be .82 for specific susceptibilty and .87 for general susceptibility. For the latter index the stability coefficients had been .75 for items measuring prevention of specific illness or accident and .72 for items measuring specific actions for prevention of illness or

students, stability coefficients of .40 and .87 for perceived susceptibility and perceived efficacy respectively were found in this study.

The third dimension of the Health Belief Model measured in this study was perceived barriers to performing health behaviors, i.e., self-efficacy. Although the concept of self-efficacy, i.e., the expectancy of succeeding or failing at a specific task, was not developed in the context of the Health Belief Model, several researchers (Beck & Lund, 1981; Condiotte & Lichtenstein, 1981; Leventhal, Safer, & Panagis, 1983; Sutton & Eiser, 1984) have demonstrated the significant association of this variable with health-related behaviors. Falling within the barriers dimension of the Health Belief Model, a person's lack of confidence in his or her ability to perform a particular health behavior within a specific environment may act as a barrier to taking further action (Janz & Becker, 1984).

Since the measurement of self-efficacy has been task-specific, standardized instruments were lacking; however, the underlying structures of most self-efficacy instruments have been based on Bandura's (1977) original description of this construct and his subsequent measurement of it. Varying in magnitude, generality, and strength, self-efficacy expectations have generally been assessed in a standard way. On a list of performance tasks, frequently ranked in order of difficulty, subjects have indicated those

tasks which they expected they could perform; for each task so indicated, subjects then rated the strength of their expectation on a 100-point probability scale. The total number of performance tasks designated with a probability above 10 was known as the level of self-efficacy; the sum of the magnitude of scores across all tasks divided by the sum of doable tasks was known as the strength of self-efficacy (Bandura & Adams, 1977). Generality was assessed by including tasks similar to ones included in the intervention or treatment.

The researcher developed a 12-item self-efficacy scale modeled after Bandura (1977) and three additional instruments measuring self-efficacy according to Bandura's theory (Condiotte & Lichtenstein, 1981; Feltz, 1982; Vallis & Bucher, 1986). Items on the scale consisted of specific health behaviors assessed by the Health Risk Appraisal questionnaire, the Health Behavior Index, and/or mentioned in the Health Risk Appraisal process and the Health Information sessions. Only the strength of self-efficacy, i.e., sum of percentages of certainty divided by number of designated tasks, was calculated for this scale. Raw scores ranged from 0% through 100% with a higher score indicating a greater perception of self-efficacy to perform a health behavior. The self-efficacy scale was pretested for clarity and ease of administration on a sample similar to the one selected for this study. A moderate test-retest reliability of .56 was found for the control group of 36 subjects.

Data Analyses

After testing and not rejecting the assumptions of homogeneity of variance and homogeneity of regression for each of the four dependent variables, a 3(treatment) x 2(risk level) factorial analysis of covariance, using the method of unweighted means, was employed to analyze the adjusted posttest means for health behaviors and for each of the three indices of health beliefs, i.e., perceived susceptibility, perceived efficacy of action, and self-efficacy. The pretest score for each of the four dependent variables was used as the covariate and a .05 level of significance was set for each analysis.

For each of the four dependent variables, main effects for treatment, main effects for health risk level, and interaction of treatment with health risk level were calculated. Since no significant interactions were found, it was not necessary to examine the data by score plots to determine the nature of the interaction. The Student Newman-Keuls multiple comparison procedure (Nie, Hull, Jenkins, Steinbrenner, & Bent, 1975) was used to analyze the significant main effects by group for perceived susceptibility and for perceived self-efficacy. In addition, a frequency distribution and, as a preliminary inquiry, measures of association between other relevant variables, e.g., health behavior and each of the three health belief variables, were also computed.

CHAPTER IV
RESULTS

The effect of the Health Risk Appraisal process on the health behavior and health beliefs of college freshmen classified as at high or average risk for future health problems was explored in this study. A total of 101 freshmen students at Eckerd College, St. Petersburg, Florida, served as subjects in one of three experimental conditions, participating in either a health information plus health risk appraisal interpretation session, a health information only session, or no session. Health behaviors and three types of health beliefs of each subject were assessed by administering the Martin Index of Health Behavior and three indices of health beliefs measuring perceived susceptibility, perceived efficacy, and perceived self-efficacy prior to and three to four weeks after the group sessions.

A description of the research sample, the results of the 3 x 2 factorial analysis of covariance used to test the hypotheses, and a summary of the results are included in this chapter.

Description of the Sample

Of the 243 students pretested for inclusion in this study, 101 participated in the treatment and posttest

phases. The means, standard deviations, and ranges of scores on the four dependent variables for the actual sample are summarized in Table 2.

Table 2

Pretest and Posttest Means, Standard Deviations, and Ranges of Scores for Dependent Variables

Variable	Mean	SD	Range
Perceived Susceptibility			
Pretest	25.50	8.07	38.00
Posttest	28.02	9.23	42.00
Perceived Efficacy			
Pretest	101.88	18.90	104.00
Posttest	103.32	18.92	96.00
Perceived Self-efficacy			
Pretest	75.02	13.66	59.00
Posttest	73.70	15.57	74.17
Health Behavior			
Pretest	50.10	8.49	44.00
Posttest	49.88	8.84	42.00

The mean scores for both perceived susceptibility and perceived efficacy beliefs increased from 25.50 to 28.02 and from 101.88 to 103.32, respectively, during the first three-and-a-half months of school. In contrast, mean perceived self-efficacy and health behavior scores decreased during that same time period from 75.02 to 73.70 and from 50.10 to 49.88, respectively, with mean health behavior scores changing the least. An inspection of the range of scores for each dependent variable indicated that for perceived

self-efficacy the range increased by over 15 points from 59.00 to 74.17 from pretest to posttest.

Intercorrelations among the pretest and posttest means of the four dependent measures were calculated. These correlations are presented in Table 3. Inspection of the correlations revealed two unexpected findings. First, low negative correlations, significant ($p < .05$) only for the posttest means ($r = -.21$), between health behavior and perceived susceptibility were found. Second, high positive correlations between health behavior and perceived self-efficacy were also discovered. These correlations were significant for both health behavior and self-efficacy pretest means ($r = .37$), and posttest means ($r = .58$). The highest significant correlations between the three health belief variables were found between pretest perceived susceptibility and self-efficacy means ($r = -.30$), posttest perceived susceptibility and self-efficacy means ($r = -.32$), pretest perceived efficacy and self-efficacy means ($r = .39$), and posttest perceived efficacy and self-efficacy means ($r = .34$).

Testing the Null Hypotheses

In this study four sets of null hypotheses were proposed which examined the effects of involvement in the Health Risk Appraisal process, a health information session, or no session on (a) health behavior, (b) perceived

Table 3

Intercorrelations Among the Pretest and Posttest Means of the Four Dependent Variables

Variables	1	2	3	4	5	6	7	8
1. Health Behavior Pretest	----	.84*	-.11	-.17	.25*	.20*	.37*	.40*
2. Health Behavior Posttest		----	-.11	-.21*	.27*	.25*	.44*	.58*
3. Perceived Susceptibility Pretest			----	.64*	.06	.09	-.30*	-.26*
4. Perceived Susceptibility Posttest				----	.04	.04	-.26*	-.32*
5. Perceived Efficacy Pretest					----	.84*	.39*	.28*
6. Perceived Efficacy Posttest						----	.34*	.34*
7. Perceived Self-efficacy Pretest							----	.56*
8. Perceived Self-efficacy Posttest								----

*p< .05

susceptibility to disease or accident, (c) perceived efficacy of health action to decrease risks, and (d) perceived self-efficacy to perform necessary behaviors for both average and high risk college freshmen. An analysis of covariance was selected to analyze the data to control for possible pretreatment group differences and the effect of pretesting experience on the posttest. For all of the hypotheses tested, the .05 level of significance was utilized.

Health Behavior

To test the effect of the Health Risk Appraisal process on health behavior, a 3 (treatment) x 2 (risk level) factorial analysis of covariance was performed on the dependent variable, health behavior, using the pretest of health behavior as a covariate. Results of this analysis are presented in Table 4, and the adjusted means of the health behavior scores for each of the three groups at each risk level are shown in Table 5.

> Hypothesis 1a: There is no significant difference in adjusted scores on a health behavior index among college freshmen involved in the Health Risk Appraisal process, in a health information session, or in neither.

The analysis of covariance was performed with an obtained F of 1.32, df = 2/94, for the main effect of treatment. Since the F ratio of 1.32 was not significant at the .05 level, this null hypothesis could not be rejected.

Table 4

Source Table for Analysis of Covariance of Health Behavior

Source	df	MS	F
Risk Level	1	143.13	6.79*
Health Group	2	27.78	1.32
Risk Level x Health Group	2	51.24	2.43
Within	94	21.07	
Total	99		

*$p < .05$

Hypothesis 1b: There is no significant difference in adjusted scores on a health behavior index after treatment between high and average risk levels of college freshmen.

A significant F value of 6.79, $p < .05$, was found for the main effect due to risk level; therefore, Hypothesis 1b was rejected. As indicated by the difference in mean risk level scores in Table 5, students at average health risk

Table 5

Adjusted Posttreatment Means of Health Behaviors for each Group and Risk Level

Group	Risk Level		Group Mean
	Average	High	
Health Group One (Treatment)	51.40	48.46	49.93
Health Group Two (Comparison)	50.47	50.80	50.63
Health Group Three (Control)	51.23	46.30	48.77
Risk Level Mean	51.08	48.06	

levels (M = 51.08) performed significantly more health behaviors than those at high risk levels (M = 48.06).

Hypothesis 1c: There is no significant interaction effect of risk level and treatment on the adjusted scores on a health behavior index of college freshmen.

This hypothesis cannot be rejected because the computed F was 2.43, $p > .05$, for interaction of risk level and health group in Table 3. Risk level did not significantly interact with the Health Risk Appraisal process.

In summary, the analysis of covariance for the health behavior scores indicated no significant interaction of treatment group and risk level on posttest health behavior and no main effect due to treatment. However, a significant difference in adjusted posttest health behavior scores between students of high and average health risk was found. Students in the high health risk group scored significantly lower on the Martin Index of Health Behavior than students in the average health risk group indicating that the high risk students practiced fewer health behaviors.

Perceived Susceptibility

The three hypotheses pertaining to the health belief perceived susceptibility were also tested by computing a 3 x 2 factorial analysis of covariance using the pretest scores on perceived susceptibility as the covariate. The source table of this analysis is located in Table 6 and the adjusted means of the perceived susceptiblity scores for each group at each risk level are listed in Table 7.

Table 6

Source Table for Analysis of Covariance of Perceived Susceptibility

Source	df	MF	F
Risk Level	1	13.04	.28
Health Group	2	199.78	4.23*
Risk Level x Health Group	2	124.72	2.64
Within	94	47.18	
Total	99		

*$p < .05$

Hypothesis 2a: There is no significant difference in adjusted scores on the health beliefs index measuring perceived susceptibility to illness or accidents among college freshmen involved in the Health Risk Appraisal process, in a health information session, or in neither.

A significant F ratio of 4.23 ($df = 2/94$, $p < .05$) for main effect due to treatment group was obtained and Hypothesis 2a can be rejected. A *post hoc* analysis using the Student Newman-Keuls procedure (Nie et al., 1975) revealed a significant difference between the Health Risk Appraisal process group and the health information group ($F = 3.485$, $p < .05$) as well as between the Health Risk Appraisal process group and the control group ($F = 4.284$, $p < .05$). In reviewing the means listed in Table 7 it can be concluded that students participating in the Health Risk Appraisal process perceived themselves to be significantly less susceptible to illness or accidents than students

participating in either the health information session or no session.

Table 7

Adjusted Posttreatment Means of Perceived Susceptibility by Group and Risk Level

Group	Risk Level		Group Means
	Average	High	
Health Group One (Treatment)	26.59	23.41	25.47
Health Group Two (Comparison)	28.58	29.55	28.96
Health Group Three (Control)	27.29	31.73	29.76
Risk Level Means	27.38	28.73	

Hypothesis 2b: There is no significant difference in adjusted scores on the health beliefs index measuring perceived susceptibility to illness or accidents after treatment between high and average health risk levels of college freshmen.

The obtained F value of .28 for effects due to risk level was not significant at the .05 level. Thus, for this study, Hypothesis 2b cannot be rejected.

Hypothesis 2c: There is no significant interaction effect of risk level and treatment on the adjusted scores on the health beliefs index measuring perceived susceptibility to illness or accidents of college freshmen.

The analysis of covariance also indicated that the Risk Level x Health Group interaction was not significant (F = 2.64, $p > .05$). The posttreatment levels of perceived susceptibility between health groups were not differentially effected by initial health risk level of the subjects.

To summarize, among the results obtained from the 3 x 2 factorial analysis of covariance computed on perceived susceptibility scores, only treatment had a significant effect. A follow-up analysis showed that the groups participating in a health information session and in no session perceived themselves to be significantly more susceptible to future illness or accidents than the group involved in the Health Risk Appraisal process.

Perceived Efficacy

A third 3 x 2 factorial analysis of covariance was performed on the dependent variable, perceived efficacy, to test the effect of the Health Risk Appraisal process on this health belief. Again, the pretest scores for this variable were used as the covariate. The results of this analysis are cited in Table 8, and the adjusted means of the three health groups and two risk levels are presented in Table 9.

> Hypothesis 3a: There is no significant difference in adjusted scores on the health beliefs index measuring perceived efficacy of preventive action among college freshmen involved in the Health Risk Appraisal process, in a health information session, or in neither.

An F value of .73 (df = 2/94, $p > .05$) was obtained for the main effect of treatment and, therefore, Hypothesis 3a cannot be rejected. Following treatment, neither the treatment, comparison, nor the control groups in this study differed significantly in their perception of the efficacy of a health behavior to reduce health risks.

Table 8

Source Table for Analysis of Covariance of Perceived Efficacy

Source	df	MS	F
Risk Level	1	85.84	.79
Health Group	2	79.35	.73
Risk Level x Health Group	2	150.52	1.39
Within	94	108.50	
Total	99		

Hypothesis 3b: There is no significant difference in adjusted scores on the health beliefs index measuring perceived efficacy of preventive action after treatment between high and average health risk levels of college freshmen.

Since the computed F value of .79 for effects due to risk level was not significant at the .05 level, Hypothesis 3b cannot be rejected. The difference between the average and high risk level means listed in Table 9 was not significant. High health risk students were no more likely than average risk students to change their perception of efficacy of preventive action after treatment.

Hypothesis 3c: There is no significant interaction effect of risk level and treatment on the adjusted scores on the health beliefs index measuring perceived efficacy of preventive action of college freshmen.

The analysis of covariance also indicated that the Risk Level x Health Group interaction was not significant ($F = 1.39$, $p > .05$). Hypothesis 3c cannot be rejected. Initial health risk level of the subjects did not

Table 9

Adjusted Posttreatment Means of Perceived Efficacy by Group and Risk Level

Group	Risk Level		Group Means
	Average	High	
Health Group One (Treatment)	102.36	100.76	101.80
Health Group Two (Comparison)	103.70	105.86	104.55
Health Group Three (Control)	106.74	100.12	103.06
Risk Level Means	103.99	101.75	

differentially affect the posttreatment level of perceived efficacy among health groups.

The results of the analysis of covariance with perceived efficacy scores disclosed no significant differences in perceived efficacy of preventive action among the three health groups or between high and average risk level students. There also was no significant interaction between risk level and health group.

Perceived Self-efficacy

A final 3 x 2 factorial analysis of covariance was computed on scores from the perceived self-efficacy index. Hypotheses 4a, 4b, and 4c were tested in this analysis, and a summary of the results is shown in Table 10. In Table 11 the adjusted means of the perceived self-efficacy scores for each of the three groups at each risk level are presented.

> Hypothesis 4a: There is no significant difference in adjusted scores on the health beliefs index measuring perceived self-efficacy to perform a health behavior

among college freshmen involved in the Health Risk Appraisal process, in a health information session, or in neither.

Table 10

Source Table for Analysis of Covariance of Perceived Self-efficacy

Source	df	MS	F
Risk Level	1	887.53	5.81*
Health Group	2	459.60	3.01*
Risk Level x Health Group	2	226.66	1.48
Within	94		
Total	99		

*$p < .05$

A significant difference in perceived self-efficacy scores among the three health groups was found ($F = 3.01$, $df = 2/94$, $p < .05$). The Student Newman-Keuls (Nie et al., 1975) procedure was employed to locate the significant differences between the health group means listed in Table 11. It was found that the Health Risk Appraisal process group, $M = 75.38$, differed significantly from the control group, $M = 68.79$, in the strength of self-efficacy beliefs ($F = 6.599$, $p < .05$), and that the health information group, $M = 77.25$, also differed significantly from the control group ($F = 8.473$, $p < .05$). Upon inspection of the means in Table 11, it was concluded that the self-efficacy beliefs of the control group, which received no health information or

risk appraisal feedback, were significantly weaker than those of either the comparison or treatment groups.

Table 11

Adjusted Posttreatment Means of Perceived Self-efficacy by Group and Risk Level

Group	Risk Level		Group Means
	Average	High	
Health Group One (Treatment)	77.51	71.44	75.38
Health Group Two (Comparison)	77.97	76.14	77.25
Health Group Three (Control)	75.83	63.14	68.79
Risk Level Means	77.18	68.84	

Hypothesis 4b: There is no significant difference in adjusted scores on the health beliefs index measuring perceived self-efficacy to perform a health behavior after treatment between among high and average health risk levels of college freshmen.

A significant F value of 5.81, $p < .05$, was found for the main effect due to risk level. Thus Hypothesis 4b can be rejected and the conclusion made that there is a difference in perceived self-efficacy between students at average and high health risk levels in this study. In reviewing the data in Table 11, it is evident that students at average risk levels (M = 77.18) have greater self-efficacy to perform necessary health behaviors than students at higher health risk levels (M = 68.84).

Hypothesis 4c: There is no significant interaction effect of risk level and treatment on the adjusted scores on the health beliefs index measuring perceived

self-efficacy to perform a health behavior of college freshmen.

This hypothesis cannot be rejected because the computed F value for interaction of risk level and health group was $F = 1.48$, $p > .05$. No differential effect of treatment on perceived self-efficacy resulted as a function of initial health risk level of the student.

To summarize, a two-way analysis of covariance was employed to test the last three hypotheses relating to perceived self-efficacy. The main effects of health group membership and risk level were both significant with no significant interaction between health group and risk level. Students in the treatment and comparison groups had significantly higher posttreatment self-efficacy scores on the index measuring this belief than those students in the control group. Additionally, students at average risk for future health problems also had significantly higher scores on the posttreatment self-efficacy index than those students who were at higher risk for future health problems.

Summary

In this chapter 12 hypotheses were tested using a 3 x 2 factorial analysis of covariance for each of the four dependent variables investigated in this study. Significant differences in adjusted posttreatment means for both perceived susceptibility and perceived self-efficacy were found among the three health groups. The Health Risk Appraisal process group scored significantly lower in

perceived susceptibility than either the health information session or control groups, and the control group scored significantly lower in perceived self-efficacy than either of the other two groups. Risk level also had a significant effect on health behavior and perceived self-efficacy with the higher risk level subjects reporting significantly fewer health behaviors and weaker self-efficacy beliefs than the average risk level subjects. There was no interaction effect of health group and risk level on any of the dependent measures.

CHAPTER V
DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

The main purpose of this study was to determine if a widely used health promotion strategy, health risk appraisal, had an immediate impact on the health behavior and health beliefs of college freshmen classified as either at average or high risk for future health problems. Combining a health risk appraisal questionnaire, personalized computer printout, and a group interpretive-informational session, the Health Risk Appraisal process was a method of communicating the risks of dying from disease or accident in the next 10 years and recommendations for personal action to reduce these risks.

It was an assumption of this study that any behavior change resulting from the Health Risk Appraisal process could be attributed to a change in or strengthening of the individual's beliefs. In previous Health Belief Model research the three beliefs identified as the most likely targets of change were perceived susceptibility to illness or accident, perceived efficacy of the behavior to reduce the health threat, and perceived self-efficacy to perform the necessary action (Janz & Becker, 1984). Of secondary interest in this study was examination of the relationship between risk level and subsequent change in behavior or

beliefs, i.e., did the impact of the Health Risk Appraisal process on health beliefs and behaviors vary with the level of initial health risk of the participant? This chapter contains a discussion of the research results, the limitations of the study, the conclusions, and recommendations for future research on the use of the health risk appraisal process.

Discussion

The results of this study confirmed a number of previous research findings and theoretical assumptions while challenging others. As a whole, this sample had pretest and posttest mean scores for health behavior of 50.10 and 49.88, respectively. These means, falling at approximately 67% of the possible maximum score of 75 for this variable, were somewhat lower than expected. Although the reports of health behavior among adolescents have not been encouraging (Green, 1981; Kreuter, Christenson, & Davis, 1983; U.S. Public Health Service ,1982), the lack of healthy behaviors in this sample of achievement-oriented, college-level adolescents was a surprise (Jessor, 1984). These findings lend further support to current reports of an increase in precollege substance use, smoking among females, and sexual activity, all indicators of a decrease in health behavior (Lester & Leach, 1983).

These students also reported low levels of perceived susceptiblity with means of 25.50 and 28.02 out of a

possible 72 points and moderate levels for perceived efficacy and perceived self-efficacy. These findings further confirm the observations of Kulik and Mahler (1987) and Weinstein (1984) that the college-age population has an unrealistic optimism regarding vulnerability to disease and accidents. However, there was considerable variability in the perceived efficacy and self-efficacy scores; the standard deviations for both variables ranged from 14.62 through 18.91 which is indicative of more heterogeneity in this sample than had previously been expected for a group of students similar in age, educational background, and socioeconomic level.

Health Behavior

Neither the Health Risk Appraisal process nor a health information session had a significant effect on the health behaviors of college freshmen in this study. These findings were consistent with reports of previous research where health risk appraisal was used alone and not in the context of a health education class with college students (Nagelberg, 1981; Wilson et al., 1980). No significant difference was found in the health behaviors of the students participating in the Health Risk Appraisal process and those who did not. This lack of significant change in behavior was not surprising. Health Belief Model advocates and other cognitively-based theorists of change posit that actual behavior change is the last stage in a step-wise progression

toward change (Brown, 1976; Green et al., 1980; Rosenstock, 1974). Preceding or accompanying actual behavior change are changes in beliefs. Failure to change health behavior may reflect the difficulty of changing beliefs, the transiency of the fear produced by the health risk appraisal, or the failure to change those specific beliefs which influence a specific health behavior change (Weinstein, 1982). Although the ultimate purpose of any health promotion strategy is behavior change, a single encounter with the message of risk and suggestion for ways to reduce such risk to health communicated via the Health Risk Appraisal process was apparently not a powerful enough intervention in this study to affect behavior, the final link in the chain of change.

The use of this procedure with entering college freshmen may also be more problematic than anticipated. The difficulty in modifying health behaviors, especially when closely connected to a lifestyle and culture or in conflict with higher priorities such as social approval and academic achievement, has been well documented in the literature (Green et al., 1980; Mechanic & Cleary, 1980). The college student lifestyle and value system does not tend to be supportive of moderation in substance use, eating, sleeping, sexual activity, or driving behavior. Despite a recent survey which has shown that college students value good health (Jacobson, 1986), rapid deterioration of health behavior during the college years has been noted (Astin,

1977). Moreover the freshman year, particularly, is one of rapid shifts in behavior and the testing of new identities and relationships (Medalie, 1981). The first semester freshmen in this sample may have been overwhelmed with the need to adapt to a new environment and meet demanding standards for achievement in the classroom.

In this study a significant difference in health behavior existed between average and high risk level students. Since the Martin Index of Health Behavior used to measure the dependent variable was similar in content to the Centers for Disease Control Health Risk Appraisal Questionnaire from which risk levels were computed, it was expected that the average risk students would score higher on the health behavior index. This expectation was confirmed by the significant differences between the adjusted means of the average risk group ($\underline{M}$ = 51.08) and the high risk group ($\underline{M}$ = 48.06).

The anticipated interaction of risk level and treatment on subsequent health behavior was not found in this study. It was thought that because higher risk level subjects would receive more negative feedback from their Health Risk Appraisal questionnaire, and thus perceive themselves as more vulnerable to future health problems, they would be more likely than average risk subjects to change health behaviors. However, correlational data from the total sample indicated that perceived susceptibility was

negatively associated with health behavior, i.e., subjects with higher perceived susceptibility had lower health behavior scores (see Table 2). It can be speculated that for the college-age population, perceived susceptibility is a "negative factor" in motivating health behavior change rather than a "positive factor" as is assumed in the Health Belief Model. This finding is in contrast to Dunton and Rasmussen's (1979) contention and Lauzon's (1977) findings with an adult population that an increased perception of risk accompanied by a report of high risk on the health risk appraisal printout is related to an increase in adoption of health behaviors. Weinstein (1984) has suggested in his research on unrealistic optimism in college students that people tend to compartmentalize behavior from perceptions of vulnerability and to selectively attend to information in such a way as to maintain self-esteem. Students receiving information regarding their higher health risk level may have distorted the information to reduce the threat to their self-esteem and to maintain an illusion of invulnerability despite their health behaviors to the contrary.

Perceived Susceptibility

The effect of the Health Risk Appraisal process on perceived susceptibility to disease and accident was assessed directly in this study. In contrast to previous assumptions that health risk appraisal increases the perception of personal vulnerability to disease and

accidents for participants (Milsum, 1980b), the students who participated in the Health Risk Appraisal process in this investigation had a lower perceived susceptibility than those receiving either the health information or no information. Involvement in the Health Risk Appraisal process thus led to a decrease in the perception of susceptibility rather than to the expected increase. Since this study and prior research based on the Health Belief Model did not conclusively support the assumption that health risk appraisal strenghtens beliefs of susceptibility (Cioffi, 1980; Faust et al.,1981), the validity of this premise must be questioned.

Several factors may be responsible for the discrepancy between the theoretical relationship of health risk appraisal to perceived susceptibility beliefs and the results of controlled research studies. First, for this young age group, the risks of dying in the next 10 years are low compared to the average adult population. Even the higher risk individuals can gain a minimal number of years of life expectancy with the risk age calculation method used for this instrument. Therefore, the risk of death information received by many of the subjects may have actually served to reduce their perception of susceptibility. Other researchers have noted this problem inherent in the use of mortality risk projection for younger populations (Cottrell & St. Pierre, 1983; Safer, 1982;

Wagner et al., 1982). Second, Weinstein (1983) noted in his research with college students that when a person falls into an average or lower risk classification, as many of these subjects did, unrealistic optimism is likely to increase.

Furthermore, Weinstein (1982) suggested that the more a subject believed that a future threat could be controlled by personal action, the less susceptible the subject perceived him or herself to be, regardless of actual behavior patterns. Since the Health Risk Appraisal process in this study emphasized the possibility of risk reduction through adoption of specific health behaviors, the strength of students' beliefs about personal susceptibility may have decreased as the sense of perceived controllability of future risks increased.

Selective attention to communications and the inability to identify with models are two additional explanations for the lack of increase in perceived susceptibility reported here. Distortion in the reception and comprehension of negative or threatening communications has been noted in the literature in communication and persuasion (Cioffi, 1980; Smith, 1982). Students may have reduced their perception of personal susceptibility by selectively attending to their personal behaviors which prevented future health risks and not attending to those which caused them. Finally, even greater unrealistic optimism among subjects may have resulted from an association of future health threats with

vivid victim stereotypes, e.g., a middle-aged, heart attack victim, with which a student could not easily identify (Weinstein, 1980).

No significant difference in perceived susceptibility between the high and average risk levels was found in this intervention. In light of Cioffi's (1980) findings, the lack of a significant difference in perceived susceptibility between the high and average risk levels was anticipated. However, this finding contradicts a basic assumption upon which health risk appraisal operates, i.e., presentation to a high risk subject of his or her greater susceptibility to future health threats, increases the subject's perception of susceptibility.

In addition, a significant interaction effect of risk level and treatment on perceived susceptibility was not found in this sample. Based on these findings and previous literature, it may be concluded that health risk appraisal does not increase reported perceived susceptibiltiy in college freshmen of either average or high health risk status. In fact, health risk appraisal may serve to actually reduce the strength of susceptibility perceptions.

Perceived Efficacy

No significant differences among the three health groups and between the two risk levels nor a significant interaction effect of risk level and treatment on perceived efficacy were found. These findings seem contrary to the

basic premises on which health risk appraisal is purported to rest. For this sample, perception of benefits of preventive action was not enhanced by exposure to health risk appraisal information which emphasized that a reduction in risks to health resulted if specific behaviors were adopted or eliminated.

Interestingly, these findings agree with those of Cioffi (1980) and Faust et al. (1981) who also reported no significant effect of health risk appraisal on perceived efficacy. Although the causal relationship of health risk appraisal to perceived efficacy beliefs has been an accepted model, clearly more research is needed to verify this association.

Self-efficacy

The effect of health risk appraisal on self-efficacy had not been previously investigated. Significant differences in self-efficacy among the three groups and between the two risk levels were found in this study. Post hoc analysis revealed that the Health Risk Appraisal process group and health information group means were not significantly different from each other but both were significantly different from the control group mean. This result suggests that students' confidence in their own ability to take health actions was enhanced by both the Health Risk Appraisal process and the health information session. Both of these groups received detailed information

about what health actions to perform and specific instructions on how to perform them. The theme stressed throughout all sessions was that good health was a choice, the choice was theirs, and they were capable of making that choice. Furthermore, emphasis was placed on proximal goal setting and the effort or difficulty involved in reaching the goals. In past research detailed instructions, goal setting, and verbal persuasion have all been used to enhance beliefs about personal or self-efficacy (Bandura, 1977a; Beck & Frankel, 1981; Schunk & Carbonari, 1984). Although feedback from a health risk appraisal printout *per se* does not tell a participant how to perform a health behavior nor encourage the setting of specific goals, the session can be structured to include these and other methods for enhancing self-efficacy beliefs in a specific situation.

Average risk students with better health habits were found to have significantly higher self-efficacy scores than high risk students. Interestingly, the significant correlations between pretest and posttest self-efficacy and health behavior means for the total sample (.37 and .58, $p < .05$, respectively) were also among the highest intercorrelations. Self-efficacy appears to correlate moderately with health behavior among college students. It can be speculated that this variable has more influence than even perceived susceptibility on the actual performance of a health behavior for this age group.

In a review of research on the Health Belief Model, Janz and Becker (1984) have suggested that the most powerful dimension of this model, i.e., that which appears most predictive of health behavior, is the barrier dimension and that perceived self-efficacy may be the critical component of that dimension. Creating ways in which health risk appraisal can be utilized to decrease barriers to action and to increase the perception of one's ability to perform a recommended health behavior may enhance its effectiveness as a health promotion tool.

Limitations

The lack of effect of the Health Risk Appraisal process on health behavior and perceived efficacy, as well as the unexpected effect of this strategy on perceived susceptibility, was not congruent with the Health Belief Model and previous suggestions in the health risk appraisal literature. This lack of effect may be partially due to problems in design and implementation of the study.

Both the Health Risk Appraisal treatment and the health information treatment consisted of a single, 60- or 75-minute session. The treatments may not have been intense or powerful enough to produce the desired effect. Similarly, the only difference between the two sessions was that personalized feedback concerning health risks was provided to the Health Risk Appraisal process group only. The difference between the treatment and comparison groups may

also not have been sufficient enough to produce significantly different results in the dependent variables.

Instruments used to measure the four dependent variables in this study were still in the experimental stage and not standardized; therefore, since pretest and posttest measures were taken, reliability of the instruments may have affected the results. The accurate assessment of health beliefs, particularly, is still in its infancy and highly valid and reliable instruments have yet to be made available. Health behavior was similarly measured by an instrument still in the developmental stages. Since subscales delineating categories of health behavior were not available for this instrument, only a general health behavior measure was used. Availability of subscales would have allowed the researcher to identify the impact of the health risk appraisal process on specific categories of health behavior.

Timing of the posttest measurement of health behavior and beliefs may have also effected the results of this research. Since only one posttreatment observation was made, 3 - 4 weeks after the Health Risk Appraisal process and health information sessions, immediate effects of the treatment may have faded or longer term effects may have not yet materialized.

The lack of agreement in previous health risk appraisal research regarding the optimal timing of outcome measurement

makes it difficult to know when the effects of this strategy can be most accurately assessed. As Cioffi (1980) stated in her study, the timing of the observation may have been inappropriate, yet guidelines for decisions concerning the timing of measurement for belief change research are sorely lacking.

In addition to problems related to intensity of treatment, measurement instruments, and timing of the posttest measurement, conclusions about this study must be further tempered by consideration of other factors limiting the interpretation and generalizability of these results. First, limitations to internal validity were experimenter bias and diffusion of treatments; history, maturity, and mortality were minor limitations and affected subjects unequally. An attempt was made to control for experimenter bias by taping and rating sessions, but since the researcher delivered all the treatments, some bias, difficult to detect even with a quality rating procedure, could have resulted. In addition, although subjects were instructed not to discuss their health risk appraisal printout or share any information from the session with other students, the social environment of a small residential campus makes it highly likely that roommates and dormitory residents could have discussed their participation in this research study.

A total of 41% of the Health Risk Appraisal process group, 50% of the health information group, and 36% of the

control group received a delayed treatment and/or posttest. Thus in regard to history and maturity, the fact that the study took place over a three-and-one-half month period during the first semester of the freshmen year meant that those subjects receiving the treatments and completing posttest questionnaires toward the latter half of that period were likely to have experienced more internal change and been exposed to different external events than those completing participation in the study within the originally planned five-week period.

Mortality was a minor limitation in that only three subjects dropped out of each of the treatment and comparison groups; two dropped out of school and four did not complete the posttest questionnaires for unknown reasons. Thus an 8% and 10% mortality rate resulted. Since the control group did not receive any treatment, it is not possible to accurately estimate a mortality figure; however, out of 80 subjects assigned to that condition, 55% did not choose to continue participation in the study.

Second, the generalizability of the results of this study are limited by the sample employed, a possible interaction effect between treatment and history, Hawthorne effect, and reactive effects. Subjects selected for this study were first semester freshmen in a private, church-related, liberal arts college. Thus generalizability is limited to similar students. Furthermore, students actually

completing the entire study did so voluntarily and may have been more interested in their health than the average college freshmen.

During the late summer and fall of 1986, when this study was conducted, publicity concerning the threat of Acquired Immune Deficiency Syndrome to the sexually active heterosexual and homosexual population and the danger of cocaine use was widespread in Florida. Daily news reports warned young people, particularly, of their vulnerability to these hazards. It is possible that this frightening information interacted with the treatment in this study and affected the health behavior and/or health beliefs of this population.

Moreover, from their initial completion of the informed consent form, students were aware of their participation in a planned research project. This awareness may have biased their responses on the outcome measures. Similarly, the self report measures of personal and socially sensitive behavior and beliefs used in this study are known to evoke socially desirable responses as well.

Conclusions

Overall it can be concluded from this study that the Health Risk Appraisal process significantly lowers perceived susceptibility and significantly raises perceived self-efficacy of college freshmen. In addition, the students at average health risk levels perform significanly more health

behaviors and have significantly greater self-efficacy than those at high risk levels.

The use of a standard health risk appraisal instrument with college freshmen lowers, not raises, perceived susceptibility to future disease and accidents. As critics have warned users of health risk appraisals, this effect on perceived susceptibility with younger populations is a real limitation of the health risk appraisal strategy (Petosa, Hyner, & Melby, 1986; Safer, 1982; Wagner et al., 1982). Emphasizing the possibility of premature death for young adults appears to stimulate a cognitive process which discounts or distorts the information in such a way as to decrease beliefs in personal susceptibility. More research similar to that of Weinstein (1980, 1982, 1983, 1984) is necessary to discover the mechanisms operating in this process. Results of this study imply that the attempt to raise perceived susceptibility via health risk appraisal appears unjustified or contraindicated with college-age populations.

It is further suggested by the outcome of this investigation that beliefs of perceived self-efficacy, not perceived susceptibility, are the critical variable influencing the actual performance of health behavior. A health risk appraisal which emphasizes (a) the ability of the participants to perform specific health actions, (b) the dissemination of highly relevant health information and

instructions on how to perform such actions, and (c) assistance with goal setting enhances perceived self-efficacy among college students. Thus the creative use of health risk appraisal, deemphasizing the avoidance of aversive future events and emphasizing the participant's ability to successfully perform health behaviors to gain future rewards, would perhaps increase the likelihood of the adoption of health behaviors in this population.

More evidence is needed to determine what specific beliefs predispose college students to perform health behaviors and in what way, if any, health risk appraisal can be utilized to facilitate the strengthening of these beliefs and, ultimately, of health behavior. By describing more fully the nature of the beliefs preceding or accompanying the health behaviors of college students, the impact of health risk appraisal may be studied more systematically.

Important directions for future use of health risk appraisal are suggested by these findings. Greater emphasis on the removal of barriers to action, particularly internal barriers of self doubt, is highly recommended. In light of this study it is pertinent to suggest recommendations for future research and practice.

Recommendations

As a contribution to the growing body of research addressing the impact of health risk appraisal on different populations, this experimental study focused on the

short-term effect of a particular Health Risk Appraisal process on the health behavior and three health beliefs, identified as salient from the Health Belief Model, of high and average risk college freshmen. In consideration of current knowledge in this field, the results of this study, and the limitations encountered, recommendations for forthcoming investigations are made.

First, a more coherent theoretical model of health behavior change is needed to guide the design and implementation of future research projects. Essential are more studies with primary objectives to synthesize the various components of the current models, further clarify the beliefs that do influence the performance of health behaviors for different populations, and determine the way in which these beliefs are formed and modified. Although the Health Belief Model continues to be a viable perspective from which to view health behaviors, it has much in common with the theory of behavioral intention (Fishbein & Ajzen, 1975), the PRECEDE model (Green et al., 1980), social learning theory (Bandura, 1977b), and persuasive/ communication theory, i.e., perceived threat control (Beck & Frankel, 1981). As these theories continue to evolve, efforts to integrate the similar concepts within each of them will assist future researchers as they plan health risk appraisal studies based on cognitively oriented models of health behavior change.

As Cioffi (1980) has suggested, health belief norms for various populations have yet to be established; therefore, more descriptive studies correlating the health beliefs, perceived susceptibility and perceived efficacy, with specific subcategories of health behaviors of various populations, are also needed. More emphasis on the perceived barriers dimension of the Health Belief Model, particularly, on the self-efficacy construct and its derivatives in other models, is also highly recommended in consideration of the findings in this study. Since attention to cognitive models and variables in health behavior change research appears to be of value and importance (Janz & Becker, 1984) continuation of research within this framework is advised.

Second, in the planning and implementation of future health risk appraisal research, investigators should consider ways to further eliminate the limitations found in this study. Increasing sample size and perhaps using intact academic classes of college students is suggested to increase the power of the data analyses and to include more students who are not just interested volunteers. Faculty and administrative support and cooperation for a large scale study also needs to be built before commencement of health risk appraisal studies on college campuses. In addition, repetition of this research project at institutions with different types of student bodies and with different classes

of students is advised to further expand the generalizability of results.

In regard to the treatment itself, a blind study where presentors are trained to deliver different health promotion treatments to individuals or groups is recommended to eliminate both experimentor bias and experimentor effect on results. Also, a two or three session treatment package would strengthen the impact of the Health Risk Appraisal process on participant's beliefs and perhaps behaviors. However, care would need to be taken to create a replicable treatment with the health risk appraisal interpretation as a central core.

Concerning selection of instruments and the timing of measurement, the standardization of format for health belief instrumentation is necessary if Health Belief Model research is to continue with integrity. Current health belief instruments need further refinement, and subscales for health behavior instruments of reasonable length need to be developed as well. Time series designs where more than one posttreatment observation is made is suggested as a way to accurately measure the process of change in health beliefs and behaviors.

Finally, it is recommended that the results of this and future health risk appraisal studies be incorporated into health promotion programs. Health risk appraisal may help to initiate behavior change but is not in itself a total

program, especially for college students. Creative and effective uses of this strategy by health counselors may include (a) the selection of instruments which appeal to the health needs and interests of the particular population served, (b) caution in use of traditional health risk appraisal instruments with younger populations, (c) emphasis on the rewards of performing recommended health behaviors rather than on the avoidance of disease or early death, and (d) the provision of accessible follow-up programs to further develop behavioral skills, environmental support, and feeling of self-efficacy with participants. Although use of health risk appraisal with college students is advocated, unreal expectations about the power of this strategy alone to modify health behaviors may limit its effective and creative application.

In summary no direct effect of the Health Risk Appraisal process on health behavior was found in this study; however, health beliefs of perceived susceptibility and perceived self-efficacy were influenced by exposure to the strategy. More research is required to answer questions raised by this study and to further illuminate our understanding of human health behavior.

APPENDIX A
HEALTH RISK APPRAISAL QUESTIONNAIRE AND PRINTOUT

(B) HEALTH RISK APPRAISAL

Health Risk Appraisal is a promising health education tool that is still in the early stages of development. It is designed to show how your individual lifestyle affects your chances of avoiding the most common causes of death for a person of your age, race and sex. It also shows how much you can improve your chances by changing your harmful habits. (This particular version is not very useful for persons under 25 or over 80 years old and for persons who have had a heart attack or other serious medical problem.)

IMPORTANT: To assure protection of your privacy, do NOT put your name on this form. Make sure that you put your Health Risk Appraisal "claim check" in your wallet or other safe place and insure that the number matches the number on this form. You must present your claim check to get your computer results.

PARTICIPANT NUMBER _____ 1-6

PLEASE ENTER YOUR ANSWERS IN THE EMPTY BOXES (use numbers only)

1. SEX [1] Male [2] Female — 7

2. RACE/ ORIGIN [1] White (non-Hispanic origin) [2] Black (non-Hispanic origin) [3] Hispanic [4] Asian or Pacific Islander [5] American Indian or Alaskan Native [6] Not sure — 8

3. AGE (At Last Birthday) _____ Years Old — 9-10

4. HEIGHT (Without Shoes) Example: 5 foot, 7½ inches = [5] [0] [8] (No Fractions) — 11-13

5. WEIGHT (Without Shoes) _____ Pounds — 14-16

6. TOBACCO [1] Smoker [2] Ex-Smoker [3] Never Smoked — 17

(Smokers and Ex-smokers) Enter average number smoked per day in the last five years (ex-smokers should use the last five years before quitting.)

- Cigarettes Per Day — 18-19
- Pipes/Cigars Per Day (Smoke Inhaled) — 20-21
- Pipes/Cigars Per Day (Smoke Not Inhaled) — 22-23

(Ex-smokers only) Enter Number of Years Stopped Smoking (Note: Enter 1 for less than one year) — 24-25

7. ALCOHOL [1] Drinker [2] Ex-Drinker (Stopped) [3] Non-Drinker (or drinks less than one drink per week) — 26

If you drink alcohol, enter the average number of drinks per week:

- Bottles of beer per week — 27-28
- Glasses of wine per week — 29-30
- Mixed drinks or shots of liquor per week — 31-32

8. DRUGS/MEDICATION How often do you use drugs or medication which affect your mood or help you to relax? [1] Almost every day [2] Sometimes [3] Rarely or Never — 33

9. MILES Per Year as a driver of a motor vehicle and/or passenger of an automobile (10,000 = average) [0] [0] [0] Thousands of miles — 34-36

10. SEAT BELT USE (percent of time used) Example: about half the time = [5] [0] % — 39-41

11. PHYSICAL ACTIVITY LEVEL
[1] Level 1 - little or no physical activity
[2] Level 2 - occasional physical activity
[3] Level 3 - regular physical activity at least 3 times per week — 42

NOTE: Physical activity includes work and leisure activities that require sustained physical exertion such as walking briskly, running, lifting and carrying.

12. Did either of your parents die of a heart attack before age 60? [1] Yes, One of them [2] Yes, Both of them [3] No [4] Not sure — 43

13. Did your mother, father, sister or brother have diabetes? [1] Yes [2] No [3] Not sure — 44

14. Do YOU have diabetes? [1] Yes, not controlled [2] Yes, controlled [3] No [4] Not sure — 45

15. Rectal problems (other than piles or hemorrhoids). Have you had:
- Rectal Growth? [1] Yes [2] No [3] Not sure — 46
- Rectal Bleeding? [1] Yes [2] No [3] Not sure — 47
- Annual Rectal Exam? [1] Yes [2] No [3] Not sure — 48

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(Continued on Other Side)

16. Has your physician ever said you have Chronic Bronchitis or Emphysema? [1] Yes [2] No [3] Not sure — 49

17. Blood Pressure (If known – otherwise leave blank) Systolic (High Number) — 50-52
Diastolic (Low Number) — 53-55

18. Fasting Cholesterol Level (If known – otherwise leave blank) MG/DL — 56-58

19. Considering your age, how would you describe your overall physical health?
[1] Excellent [2] Good [3] Fair [4] Poor — 59

20. In general how satisfied are you with your life?
[1] Mostly Satisfied [2] Partly Satisfied [3] Mostly Disappointed [4] Not Sure — 60

21. In general how strong are your social ties with your family and friends?
[1] Very strong [2] About Average [3] Weaker than average [4] Not sure — 61

22. How many hours of sleep do you usually get at night?
[1] 6 hours or less [2] 7 hours [3] 8 hours [4] 9 hours or more — 62

23. Have you suffered a serious personal loss or misfortune in the Past Year? (For example, a job loss, disability, divorce, separation, jail term, or the death of a close person)
[1] Yes, one serious loss [2] Yes, Two or More serious losses [3] No — 63

24. How often in the Past Year did you witness or become involved in a violent or potentially violent argument?
[1] 4 or more times [2] 2 or 3 times [3] Once or never [4] Not sure — 64

25. How many of the following things do you usually do?
- Hitch-hike or pick up hitch-hikers
- Carry a gun or knife for protection
- Keep a gun at home for protection
- Criticize or argue with strangers
- Live or work at night in a high-crime area
- Seek entertainment at night in high-crime areas or bars

[1] 3 or more [2] 1 or 2 [3] None [4] Not sure — 65

26. Have you had a hysterectomy? (Women only) [1] Yes [2] No [3] Not sure — 66

27. How often do you have Pap Smear? (Women only)
[1] At least once per year [2] At least once every 3 years [3] More than 3 years apart
[4] Have never had one [5] Not sure [6] Not applicable — 67

28. Was your last Pap Smear Normal? (Women only) [1] Yes [2] No [3] Not sure [4] Not applicable — 68

29. Did your mother, sister or daughter have breast cancer? (Women only) [1] Yes [2] No [3] Not sure — 69

30. How often do you examine your breasts for lumps? (Women only)
[1] Monthly [2] Once every few months [3] Rarely or never — 70

31. Have you ever completed a computerized Health Risk Appraisal Questionnaire like this one?
[1] Yes [2] No [3] Not sure — 71

32. Current Marital Status
[1] Single (Never married) [2] Married [3] Separated
[4] Widowed [5] Divorced [6] Other — 72

33. Schooling completed (One choice only)
[1] Did Not graduate from high school [2] High School
[3] Some College [4] College or Professional Degree — 73

34. Employment Status
[1] Employed [2] Unemployed
[3] Homemaker, Volunteer, or Student [4] Retired, Other — 74

35. Type of occupation (SKIP IF NOT APPLICABLE)
[1] Professional, Technical, Manager, Official or Proprietor [2] Clerical or Sales
[3] Craftsman, Foreman or Operative [4] Service or Laborer — 75

36. County of Current Residence (SKIP IF NOT KNOWN)
[9][9][9] Other — 76-78

37. State of Current Residence
[9][9] Other — 79-80

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(Lasco, Moriarty, & Nelson, 1985, pp. 4 - 5)

1 900213 HEALTH RISK APPRAISAL DATE: 08/21/86

YOUR HEALTH RISK DATA HAVE BEEN ANALYZED AND THE RESULTS ARE SUMMARIZED BELOW AS THEY RELATE TO THE 12 MOST FREQUENT CAUSES OF DEATH FOR WHITE MALES AGED 18.

0

RANK	CAUSE OF DEATH	CHANCES OF DYING PER 100,000 WITHIN THE NEXT 10 YEARS			
		COL. 1 AVERAGE	COL. 2 APPRAISAL	COL. 3 ACHIEVABLE	COL 2-COL. 3 DIFFERENCES
1	MOTOR VEHICLE ACCIDENTS	664	597	478	119
2	NON-MOTOR VEHICLE ACCIDENTS	299	299	299	0
3	SUICIDE	260	130	130	0
4	HOMICIDE	141	211	211	0
5	LEUKEMIA	21	21	21	0
6	PNEUMONIA	16	14	14	0
7	STROKE	16	13	13	0
8	LYMPHOSARCOMA/HODGKINS	15	15	15	0
9	CIRCULATORY DEFECTS	11	11	11	0
10	CANCER OF THE BRAIN	11	11	11	0
11	HEART ATTACK	10	2	2	0
12	CIRRHOSIS OF THE LIVER	7	7	7	0
	ALL OTHER CAUSES	338	338	338	0
	ALL CAUSES OF DEATH	1809	1671	1551	119

1 900022 HEALTH RISK APPRAISAL DATE: 0 Page 307

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	ACTUAL	APPRAISED	ACHIEVABLE	DIFFERENCE
AGE:	18	18.0	18.0	0.0

FOR HEIGHT 75 INCHES AND MEDIUM FRAME, 189 LBS. IS APPROXIMATELY 9% OVERWEIGHT - - - DESIRABLE WEIGHT IS 174 LBS.

* AVERAGE CHANCES OF DYING ARE BASED ON 1975-1977 U. S. MORTALITY DATA. (CDC VERSION 2.1A)
* APPRAISED AGE (OR "HEALTH AGE") IS AN ESTIMATE OF HOW HEALTHY YOU ARE COMPARED TO OTHERS OF YOUR RACE AND SEX.
* ACHIEVABLE AGE IS AN ESTIMATE OF HOW HEALTHY YOU COULD BE BY MAKING THE CHANGES RECOMMENDED BELOW:

POSITIVE AREAS OF YOUR LIFESTYLE

GOOD PHYSICAL ACTIVITY HABITS
NON-SMOKER
NEAR RECOMMENDED WEIGHT
GOOD STRESS CONTROL
LITTLE OR NO ALCOHOL
LITTLE OR NO DRUG USE

RECOMMENDED LIFESTYLE CHANGES

BUCKLE YOUR SEATBELT ALL OF THE TIME

* NOTE -- HOMICIDE RISK IS PARTLY BASED ON HIGH-RISK ACTIVITIES INCLUDING USE OF WEAPONS, ENCOUNTERS WITH STRANGERS AND THE AMOUNT OF CONTACT WITH HIGH-CRIME AREAS.

* NOTE -- SUICIDE RISK IS PARTLY BASED ON ANSWERS TO QUESTIONS ABOUT PHYSICAL HEALTH, LIFE SATISFACTION, SOCIAL TIES, HOURS OF SLEEP, RECENT LOSS OR MISFORTUNE AND MARITAL STATUS.

1 900213 * * * DETAIL * * *

CAUSE OF DEATH	CONDITION	APPRAISAL AS APPRAISED	APPRAISAL PARTIAL RISK	APPRAISAL TOTAL RISK	ACHIEVABLE ACHIEVED	ACHIEVABLE PARTIAL RISK	ACHIEVABLE TOTAL RISK
MOTOR VEHICLE ACCIDENTS	ALCOHOL	3-6 DRINKS PER WEEK	1.0		3-6 DRINKS PER WEEK	1.0	
	MILES PER YEAR	10000	1.0		10000	1.0	
	SEATBELT	10-24%	1.0		75-100%	0.8	
	DRUG USE	RARELY OR NEVER	0.9	0.90	RARELY OR NEVER	0.9	0.72
SUICIDE	DISTRESS	BELOW AVERAGE RISK	0.5		BELOW AVERAGE RISK	0.5	
	ALCOHOL	3-6 DRINKS PER WEEK	1.0	0.50	3-6 DRINKS PER WEEK	1.0	0.50
HOMICIDE	VIOLENT EVENTS	SAW OR IN 4+/YEAR	2.0		SAW OR IN 4+/YEAR	2.0	
	LIFESTYLE	BELOW AVERAGE RISK	0.5	1.50	BELOW AVERAGE RISK	0.5	1.50
PNEUMONIA	ALCOHOL	3-6 DRINKS PER WEEK	1.0		3-6 DRINKS PER WEEK	1.0	
	SMOKING	NON-SMOKER	1.0		NON-SMOKER	1.0	

1 900022 HEALTH RISK APPRAISAL DATE: 0 Page 306

	EMPHYSEMA	DOES NOT HAVE	0.9	0.90	DOES NOT HAVE	0.9	0.90
STROKE	DIABETES	NOT DIABETIC	0.9		NOT DIABETIC	0.9	
	SMOKING	NON-SMOKER	0.9	0.81	NON-SMOKER	0.9	0.81
HEART ATTACK	DIABETES	NOT DIABETIC	0.9		NOT DIABETIC	0.9	
	WEIGHT	189	1.0		174	0.9	
	ACTIVITY LEVEL	RECOMMENDED	0.6		RECOMMENDED	0.6	
	SMOKING	NON-SMOKER	0.5		NON-SMOKER	0.5	
	FAMILY HISTORY	NO	1.0	0.26	NO	1.0	0.24
CIRRHOSIS OF THE LIVER	ALCOHOL	3-6 DRINKS PER WEEK	1.0	1.00	3-6 DRINKS PER WEEK	1.0	1.00

0

* RISK FACTORS ADAPTED FROM "HOW TO PRACTICE PROSPECTIVE MEDICINE", DRS. ROBBINS AND HALL, METHODIST HOSPITAL OF INDIANA, 1970.
* COMPUTER PROGRAM DEVELOPED BY THE CENTERS FOR DISEASE CONTROL (CDC), DHHS, ATLANTA GEORGIA. (CDC VERSION 2.1A)

NOTE HEALTH RISK APPRAISAL IS STILL IN ITS EARLY STAGES OF DEVELOPMENT ITS MAIN VALUE IS ITS POTENTIAL FOR SHOWING THE HEALTH AND SAFETY RISKS ASSOCIATED WITH COMMON LIFESTYLE FACTORS. HOWEVER, IT DOES NOT INCLUDE ALL PERSONAL RISKS AND PROTECTIVE FACTORS, AND - IN PARTICULAR - DOES NOT INCLUDE MOST OCCUPATIONAL RISKS AND ENVIRONMENTAL FACTORS. SINCE I IS A DEVELOPMENTAL PROGRAM, IT SHOULD BE INTERPRETED BY A QUALIFIED HEALTH PROFESSIONAL.

---PLEASE NOTE-- THE ABOVE ANALYSIS IS INCOMPLETE DUE TO MISSING ANSWERS RELATING TO THE FOLLOWING CONDITIONS.
MILES PER YEAR
SYSTOLIC BP
DIASTOLIC BP
CHOLESTEROL

APPENDIX B
HEALTH RISK APPRAISAL SESSION

Health Risk Appraisal Session

I. Registration of participants

A. Check-in at table

B. Information packet distribution

1.* Health Risk Appraisal printout and information sheets

2. Exercise worksheets #1* and #2

3. Health Choices resource booklet

II. Introduction

A. Welcome to session

B. Preview of program

1. Objectives

2. Content

III. "Health--The Choice is Yours" Program

A. Health as wellness (T)

B. Factors influencing health (T)

C. Value of Health

1. For self and others

2. Physically, emotionally, and financially

3. Short and long term

D. Consequences of loss of health

E. Personal choices and health status

1. Relationship between behavior and disease

a. Belloc and Breslow study (1972)

b. Seven critical health habits (T)

2. Life expectancy in U.S.A. (T)

a. Current average

b. Reduction with premature mortality

c. Precursors of leading causes of death

3. Stages in etiology of disease (T)

4. Young adults and health status (T)

a. Leading causes of death

b. Precursors associated with mortality

F.* Health Risk Appraisal interpretation of printouts (Worksheet #1)

1. Purpose and limitations of risk appraisal

2. Chance of Death Table (T)

3. Health Age

4. Weight

5. Table of Recommended Behavior Change (T)

a. Maintenance of positive areas

b. Recommended changes

6. Detail Table--Precursors to mortality (T)

7. Group summary data

H.** Health choices--Examples of What and How

1. Exercise

2. Nutrition/Weight Control

3. Sleep

4. Auto Safety

5. Substance Use

6. Stress Management

7. Intimate Relationships

8. Medical and self-exams

G. Actual to optimal health (worksheet #2)

1. Maintaining or changing behavior

2. Difficulty rating

3. Steps to getting there

4. Contracting

5. Social support

IV. Conclusion

A. Review

1. Value of optimal health

2. Personal choices and health status

3. Precursors to accident and disease

4. Recommended changes

5. Accessibility of resources

6. Choices and personal responsibility

B. Preview

1. Readministration of questionnaires in 3 weeks

2. Availability of personal consultatiion

3. Appreciation of cooperation and involvement

*Eliminated completely in Health Information session

**Reference to Health Choices booklet

(T) Overhead transparencies used as presentation aid

Dear Student,

This printout is your personal health risk profile, based on your answers to the Health Risk Appraisal questionnaire and different from any other student's profile.

During this session you will be assisted in understanding the information which includes:

a. various risks to your health associated with your behaviors and
b. recommendations for changes in behavior to reduce your health risks

These results do not predict future events but give estimates of your health risks.

Please DO NOT COMPARE YOUR HEALTH RISK APPRAISAL RESULTS WITH OTHER STUDENTS. Your cooperation in this matter is essential.

Health Risk Appraisal Worksheet #1

		Today	Future
1.	My actual age is	_____	45
	My appraised age is	_____	_____
	My achievable age is	_____	_____
2.	Appraised age	_____	_____
-	Achievable age	_____	_____
	Total years added to Lifespan	_____	_____

3. The top 4 causes of death for a person my age, sex, and race today.

_____ _____

_____ _____

4. I am at greater than average risk for the following causes of death:

_____ _____

_____ _____

5. The following factors contribute to my risk of disease or accident:

_____ _____

_____ _____

6. To reduce my risk of premature death I can choose to make the following behavior changes:

_____ _____

_____ _____

NAME_____ DATE_____

ACTUAL TO OPTIMAL HEALTH BEHAVIOR Worksheet #2

CHANGE MAINTAIN	DIFFICULTY	CATEGORY	ACTUAL	STEPS TO GET THERE	OPTIMAL
		WEIGHT			
		NUTRITION			
		SEAT BELT			
		EXERCISE			
		ALCOHOL USE			
		DRUG USE			
		TOBACCO USE			
		CAFFEINE USE			
		SLEEP			
		TENSION/STRESS			
		RELATIONSHIPS			

I, _____, CHOOSE TO IMPROVE OR MAINTAIN MY HEALTH IN THE AREA OF _____

BY TAKING THESE SPECIFIC STEPS:_____.

THREE PEOPLE WHO WILL SUPPORT MY EFFORTS ARE _____, _____, AND _____.

I WILL COMPLETE THIS ACTION BETWEEN _____ AND _____.

APPENDIX C
HEALTH BELIEFS AND HEALTH BEHAVIOR QUESTIONNAIRES

Dear Student,

Please answer all of the following questions about your health beliefs and behaviors. Read the instructions for each section carefully. Answer as accurately and honestly as you can. Remember that your responses will be confidential. Thank you for your participation.

HEALTH BELIEFS QUESTIONNAIRE - SECTION I

Please answer all questions on this form. There are no right or wrong answers. Circle the number that best expresses your response to the question.

1. In the next 10 years, how much chance do you think there is that you could ever get the following conditions?	None at all	A Little	A fair chance	A moderate chance	Quite a good chance	A very good chance
a. heart disease	1	2	3	4	5	6
b. a stroke	1	2	3	4	5	6
c. high blood pressure	1	2	3	4	5	6
d. lung cancer	1	2	3	4	5	6
e. alcoholism	1	2	3	4	5	6
f. serious emotional problems	1	2	3	4	5	6
g. pneumonia	1	2	3	4	5	6
h. cancer of the colon	1	2	3	4	5	6
<u>For women only</u>:						
i. breast cancer	1	2	3	4	5	6
j. cervical cancer	1	2	3	4	5	6
2. In the next 10 years how much chance do you think there is that you could be involved in a motor vehicle accident?	1	2	3	4	5	6

3. How easily would you say that you get sick?	Not at all	Slightly	Fairly	Moderately	Quite Easily	Very Easily
	1	2	3	4	5	6

4. How easily would you say that you get involved in automobile accidents?	Not at all	Slightly	Fairly	Moderately	Quite Easily	Very Easily
	1	2	3	4	5	6

5. How much do you think a person can do for himself/herself to prevent the following health problems?	Nothing	A Little	A fair amount	A moderate amount	A lot	Very great deal
a. heart disease	1	2	3	4	5	6
b. a stroke	1	2	3	4	5	6
c. high blood pressure	1	2	3	4	5	6
d. lung cancer	1	2	3	4	5	6
e. alcoholism	1	2	3	4	5	6
f. serious emotional problems	1	2	3	4	5	6
g. pneumonia	1	2	3	4	5	6
h. cancer of the colon	1	2	3	4	5	6
For women only:						
i. breast cancer	1	2	3	4	5	6
j. cervical cancer	1	2	3	4	5	6

6. How much do you think a person can do for himself/herself to prevent a motor vehicle accident?	1	2	3	4	5	6

7. Many people think that there are things they can do to help prevent health problems. How much do you believe each of the following actions can prevent serious health problems?	Would do nothing to prevent					Would completely prevent
a. having regular checkups	1	2	3	4	5	6
b. having special medical tests done	1	2	3	4	5	6

	Would do nothing to prevent					Would completely prevent
c. not being overweight or underweight	1	2	3	4	5	6
d. not drinking too much	1	2	3	4	5	6
e. not smoking cigarettes	1	2	3	4	5	6
f. getting enough sleep and rest	1	2	3	4	5	6
g. eating special foods	1	2	3	4	5	6
h. taking vitamins	1	2	3	4	5	6
i. planned exercise program	1	2	3	4	5	6
j. avoiding tension and anxiety	1	2	3	4	5	6

8. Many people think that there are things they can do to prevent serious motor vehicle accidents.

   How much do you believe each of the following actions can prevent serious motor vehicle accident injuries?

a. Using a seat belt 75-100% of the time	1	2	3	4	5	6
b. Observing the speed limit	1	2	3	4	5	6
c. Not driving after drinking	1	2	3	4	5	6
d. Not driving when tired or drowsy	1	2	3	4	5	6
e. Keeping the car in good condition	1	2	3	4	5	6

HEALTH BELIEFS QUESTIONNAIRE - SECTION II

First, place a check mark in the space following the health behaviors which you believe that you will be able to perform during your first year here at Eckerd College. Only for the behavior checked, on the scale to the right of the behavior, circle the degree of certainty, from 100% certain (highly certain) to only 10% certain (highly uncertain) that you can perform that behavior.

HEALTH BEHAVIOR	ABLE TO PERFORM	PERCENT OF CERTAINTY (Highly uncertain) (Highly certain)									
1. Stay within 10 pounds of recommended weight	____	10	20	30	40	50	60	70	80	90	100
2. Eat breakfast 6-7 days per week	____	10	20	30	40	50	60	70	80	90	100
3. Avoid smoking cigarettes	____	10	20	30	40	50	60	70	80	90	100
4.Sleep 7-8 hours per night	____	10	20	30	40	50	60	70	80	90	100
5.Exercise at least 3x per week	____	10	20	30	40	50	60	70	80	90	100
6.Drink 2 or less caffeinated drinks per day	____	10	20	30	40	50	60	70	80	90	100
7.Wear a seat belt while driving or riding in a car	____	10	20	30	40	50	60	70	80	90	100
8.Avoid driving or riding with someone under the influence of alcohol	____	10	20	30	40	50	60	70	80	90	100
9.Drink one alcoholic drink or less per day	____	10	20	30	40	50	60	70	80	90	100
10. Practice personal tension control skills	____	10	20	30	40	50	60	70	80	90	100
11. Avoid use of unnecessary or recreational drugs	____	10	20	30	40	50	60	70	80	90	100
12. Do a Breast(F) or Testicular(M) self exam monthly	____	10	20	30	40	50	60	70	80	90	100

MARTIN INDEX OF HEALTH BEHAVIOR

Index of Health Behavior

Instructions: For the following questions put a check in the blank by the choice which best describes your health behavior. There are no right or wrong answers. The best answer is the one which honestly describes you.

1. How many days per week do you eat breakfast?

____ a. 6 - 7
____ b. 4 - 5
____ c. 2 - 3
____ d. 0 - 1

2. Which choice most closely describes your daily eating pattern?

____ a. eating snack foods (potato chips, soda pop, cookies, candy, pastry, etc.) whenever I feel hungry
____ b. eating one balanced meal per day and eating snack foods at other times during the day
____ c. eating two balanced meals per day and eating snack foods at other times during the day
____ d. eating three balanced meals per day and eating snack foods at other times during the day
____ e. eating three balanced meals per day and not snacking

3. How many days per week do you eat a balanced diet that includes at least the minimum number of servings from the four food groups as listed below?
   2 servings of meat or protein substitutes
   2 servings of dairy products
   4 servings of breads and cereals
   4 servings of fruits and vegetable

____ a. 6 - 7
____ b. 4 - 5
____ c. 2 - 3
____ d. 0 - 1

4. How many servings per day of concentrated sources of sugar (soda pop, candy, cookies, etc.) do you eat?

____ a. 0 or less than 1
____ b. 1 - 2
____ c. 3 - 4
____ d. 5 or more

5. Considering your height and body build, how many pounds within your ideal weight do you fall?

____ a. within 10 pounds
____ b. within 20 pounds
____ c. within 30 pounds
____ d. more than 30 pounds from ideal

6. Which choice more closely describes your dieting behavior?

____ a. never being overweight, so never dieting
____ b. being more than 10 pounds overweight, but not dieting
____ c. when overweight, going on a fad diet to lose weight quickly
____ d. when overweight attempting to lose weight gradually (1 - 2 pounds per week) by increasing exercise or decreasing food intake
____ e. when overweight attempting to lose weight gradually (1 - 2 pounds per week) by increasing exercise and decreasing food intake

7. What is the average number of hours per night that you sleep?

____ a. more than 10
____ b. 9 - 10
____ c. 7 - 8
____ d. 5 - 6
____ e. 0 - 4

8. How often do you use seatbelts while driving or riding in a car?

____ a. always
____ b. never in town and always on the highway
____ c. sometimes in town and sometimes on the highway
____ d. never

9. How often do you drive or ride with someone under the influence of alcohol or drugs?

____ a. more than once a week
____ b. once per week
____ c. a few times per year
____ d. never

10. Which choice best describes your consumption of alcoholic beverages?

____ a. not drinking
____ b. drinking one drink or less per day
____ c. drinking two drinks or less per day
____ d. drinking two drinks or less on weekdays and more than two drinks per day on weekends
____ e. drinking more than two drinks per day on most days

11. Which choice best describes your drug use pattern (over the counter, prescription and recreational drugs)

____ a. using the drugs I want whenever I want
____ b. using the drugs I feel I need while following common sense
____ c. using only medically required drugs exactly as directed
____ d. rarely using drugs of any kind

12. How many cups of caffeinated beverages (coffee, tea, cola, etc.) do you drink per day?

____ a. none or less than 1
____ b. 1 - 3
____ c. 4 - 6
____ d. 7 or more

13. Which choice best describes your cigarette smoking behavior?

____ a. not smoking
____ b. smoking less than one pack per day
____ c. smoking 1 - 2 packs per day
____ d. smoking more than 2 packs per day

14. How many times per week do you exercise aerobically (biking, jogging, swimming, aerobics class, etc.)?

____ a. less than 1
____ b. 1
____ c. 2
____ d. 3 - 4
____ e. 5 or more

15. How many times per week do you do other types of exercise(weight lifting, tennis, calisthenics, racquetball, basketball, etc) besides aerobic activities?

____ a. less than 1
____ b. 1
____ c. 2
____ d. 3 - 4
____ e. 5 or more

16. How often do you brush your teeth?

____ a. after every meal
____ b. twice per day
____ c. once per day
____ d. less than once per day

17. How often do you have a dental check-up?

____ a. never or only when something is wrong
____ b. every 2 - 3 years
____ c. every year
____ d. every six months

18. How often do you have a medical check-up?

____ a. never or only when something is wrong
____ b. only for Pap tests or other checks
____ c. every 3 - 5 years
____ d. at least every 2 years

19. How often do you read the labels on foods and over-the-counter drugs before purchasing them?

____ a. always
____ b. usually
____ c. sometimes
____ d. rarely

20. How many times per week do you make a conscientious effort to manage your stress by utilizing progressive relaxation, exercise, religion, music, or other stress reduction techniques?

____ a. 6 - 7
____ b. 4 - 5
____ c. 2 - 3
____ d. 0 - 1

21. Which choice most correctly describes your closest interpersonal relationship?

____ a. not having a friend
____ b. having a friend, but I am not able to share my real feelings with the person
____ c. having a friendship where I can sometimes share my real feelings, but sometimes I can't
____ d. having a friendship where I can always share my real feelings

22. How many servings per day of foods high in saturated fats or cholesterol (whole milk, eggs, sausage, bacon, red meat, etc.) do you eat?

____ a. 0
____ b. 1 - 2
____ c. 3 - 4
____ d. 5 or more

23. How often do you limit your consumption of salt by doing things like not salting your foods at the table, using salt sparingly when preparing foods, and limiting your intake of salty foods?

____ a. always
____ b. usually
____ c. sometimes
____ d. rarely

24. How often do your practice breast self examination (female) or testicular self examination (male)?

____ a. every month
____ b. every 2 - 6 months
____ c. less fequently than every 6 months
____ d. never

25. Which choice best describes your contraceptive use?

____ a. not sexually active, so don't use contraceptives
____ b. attempting to get pregnant or am pregnant, so don't use contraceptives
____ c. sexually active and always use contraceptives
____ d. sexually active and usually use contraceptives
____ e. sexually active and sometimes use contraceptives
____ f. sexually active and rarely use contraceptives

APPENDIX D
REMINDER LETTERS FOR GROUPS

Dear Student,

Thank you for participating in the Health Risk reduction project here at Eckerd College. Your continued involvement is appreciated and essential if we are to succeed in enhancing the health and well-being of students on campus.

You have been randomly assigned to Health Group One. You will meet in Roberts Music Center in Room 101 at 1:00PM on Monday, August 25th for an opportunity to find out why with health, "The Choice is Yours." This session will last only 75 minutes and we believe it will be a valuable and interesting experience for you as you begin your career here at Eckerd.

Thank you for your cooperation.

Claire Stiles

ROBERTS MUSIC CENTER IS LOCATED ACROSS THE STREET FROM THE HEALTH CENTER, TOWARD THE WATER, AND NEXT TO THE POND.

Dear Student,

Thank you for participating in the Health Risk reduction project here at Eckerd College. Your continued involvement is appreciated and essential if we are to succeed in enhancing the health and well-being of students on campus.

You have been randomly assigned to Health Group Two. You will meet in Roberts Music Center in Room 101 at 2:30PM on Monday, August 25th for an opportunity to find out why with health, "The Choice is Yours." This session will last only 75 minutes and we believe it will be a valuable and interesting experience for you as you begin your career here at Eckerd.

Thank you for your cooperation.

Claire Stiles

ROBERTS MUSIC CENTER IS LOCATED ACROSS THE STREET FROM THE HEALTH CENTER, TOWARD THE WATER, AND NEXT TO THE POND.

Dear Student,

Thank you for participating in the Health Risk reduction project here at Eckerd College. Your continued involvement is appreciated and essential if we are to succeed in enhancing the health and well-being of students on campus.

You have been randomly assigned to Health Group Three. Due to time constraints you will not meet until 6:30PM on Tuesday, September 23rd in Roberts Music Center, Room 101, for an opportunity to find out why with health, "The Choice is Yours." This session will last only 75 minutes and we believe it will be a valuable and interesting experience for you as you begin your career here at Eckerd.

Thank you for your cooperation.

Claire Stiles

ROBERTS MUSIC CENTER IS LOCATED ACROSS THE STREET FROM THE HEALTH CENTER, TOWARD THE WATER, AND NEXT TO THE POND.

APPENDIX E
INFORMED CONSENT FORM

Informed Consent Form

Research Title: Impact of the Health Risk Appraisal process on Health Behaviors and Beliefs of College Freshmen

Principal Investigator: Claire A. Stiles, Ph.D. candidate, Counselor Education Department University of Florida

I agree to voluntarily participate in the research project as explained below:

The aim of this study is to explore the relationship between knowledge of personal health risks and availability of health promotion resources and the health behaviors and health beliefs of college freshmen at different levels of appraised health risk. This information will be used to enhance the health and well-being of students at Eckerd College.

To participate in this study you will need to do the following things:

1. Complete three questionnaires concerning your health behaviors and beliefs
2. Attend a 75-minute session on health choices
3. Complete two questionnaires again in approximately 5 weeks

Please feel free to ask any questions which you might have at this time. You may contact me at Ext. 454/471 or at my office in Roberts Music Center, Room 108 if you have any additional questions in the future.

The above stated nature and purpose of this research, including discomforts, and risks involved (if any) have been explained to me. Furthermore, I understand that this investigation may be used for educational purposes which may include publication. I also understand that I may withdraw my consent at any time without prejudice.

To protect confidentiality within legal limits (or to the extent provided by law) a control card with your code number and a line for your name plus a detachable claim check number is attached to your packet of questionnaires. This control card will be collected and filed apart from the questionnaires, used only to notify you about your group meeting, and destroyed immediately upon completion of this research study.

I have read and I understand the procedure described above. I agree to participate in the procedure and I have received a copy of this description.

Signed _____ Date _____

I have defined and explained fully this research to the participant whose signature appears above.

Signed _____

APPENDIX F
HEALTH SESSION TAPE EVALUATION FORM

RATER_____ TAPE_____

HEALTH SESSION TAPE EVALUATION FORM

SPEAKER DELIVERY: FOR EACH ITEM DESCRIBING THE SPEAKER'S DELIVERY OF THE HEALTH PROGRAM CONTENT, RATE THE QUALITY OF THAT ITEM ON A SCALE FROM 1 - 5. CIRCLE THE NUMBER THAT BEST EXPRESSES YOUR EVALUATION OF THE SPEAKER'S PRESENTATION.

	POOR	FAIR	AVER	GOOD	EXC
1. CLARITY AND ENUNCIATION	1	2	3	4	5
2. APPROPRIATENESS OF VOCABULARY	1	2	3	4	5
3. RATE OF SPEECH	1	2	3	4	5
4. VITALITY AND ENERGY	1	2	3	4	5
5. VOLUME AND PROJECTION	1	2	3	4	5
6. WARMTH AND FRIENDLINESS	1	2	3	4	5
7. SINCERITY	1	2	3	4	5
8. INTEREST IN SUBJECT	1	2	3	4	5
9. LOGICAL PROGRESSION OF IDEAS	1	2	3	4	5
10. OVERALL QUALITY	1	2	3	4	5

CONTENT: FOR EACH CONTENT AREA LISTED BELOW CHECK WHETHER OR NOT THE TOPIC WAS INCLUDED IN THIS TAPE SESSION.

	INCLUDED	NOT INCL
A. DEFINITION OF HEALTH AS WELLNESS	_____	_____
B. FACTORS INFLUENCING HEALTH STATUS	_____	_____
C. VALUE OF HEALTH	_____	_____
D. RELATIONSHIP BETWEEN BEHAVIOR AND HEALTH STATUS	_____	_____
E. HEALTH RISK APPRAISAL INTERPRETATION	_____	_____
F. EXAMPLE OF HEALTH CHOICES	_____	_____
G. WORKSHEET USE FOR HEALTH CHANGES	_____	_____
H. SUMMARY - PERSONAL RESPONSIBILITY FOR HEALTH CHOICES	_____	_____

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BIOGRAPHICAL SKETCH

Born and raised in Little Falls, New Jersey, Claire Ann Schmidt Stiles attended Rutgers University, Douglass College, where she obtained a Bachelor of Science degree in health and physical education in January of 1969. After teaching physical education for three years in the public high schools of Westfield, NJ, and San Antonio, TX, she entered the graduate program in the Department of Health and Physical Education, Southwest Texas State University, San Marcos, and received a Master of Arts degree in health and physical education in May 1972. After serving as an instructor in her major department at Southwest Texas State University for one year, Ms. Stiles taught and coached in the youth programs at the U. S. Air Force Academy in Colorado Springs, CO, and in the public high school in Monument, CO, until 1976.

Upon moving to Florida, Ms. Stiles served on the faculty and coaching staff at St. Leo College for one year and, since 1977, has been employed as a faculty member at Eckerd College, St. Petersburg, FL. From her initial position as Coordinator of Women's Athletics and Assistant Professor of Physical Education, Ms. Stiles has evolved professionally into an Assistant Professor of Human

Resources and a parttime counselor in the college counseling center.

Entering the Specialist of Education degree program in the Department of Counselor Education at the University of Florida in August of 1982, Ms. Stiles was awarded her Specialist of Education degree in agency, correctional, and developmental counseling in August of 1984. During that year she was accepted into the doctoral program in agency, correctional, and developmental counseling in the Department of Counselor Education. While enrolled in her graduate studies, Ms. Stiles worked parttime in the Fear Clinic, Department of Clinical Psychology at the University of Florida, and completed practica and internships at the Alachua County Crisis Center, Eckerd College Counseling Center, and Family Service Centers in St. Petersburg. Specializing in the field of health counseling and health promotion consultation, Ms. Stiles is currently administering a student health lifestyle leaders grant on the Eckerd College campus and a pilot health promotion program grant for the Southwest Florida Presbytery, Presbyterian Church, U.S.A.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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